PULP & PAPER

August 1987

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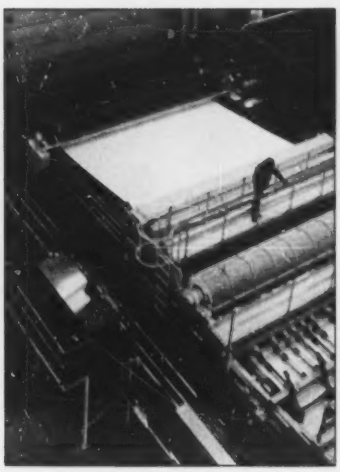
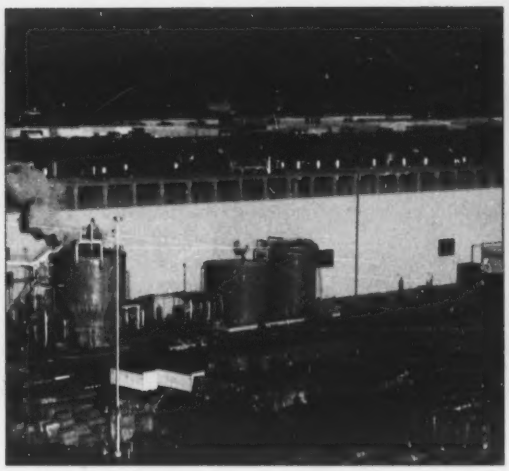
Volume 61
Number 8

AUGUST





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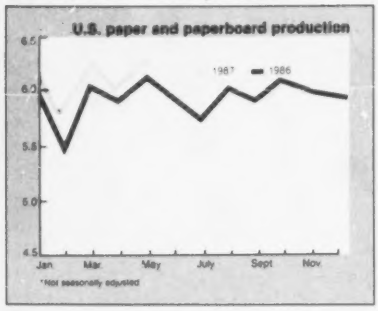
MONTH IN STATISTICS

U.S. paper and board production



U.S. production of paper and paperboard totaled 6.3 million tons in May, up 4.0% from the same month in 1986, according to the American Paper Institute. Production continued at a record-breaking pace for all sectors of the industry, API reported. Paper production for the first five months was up 2.9% compared with last year, while paperboard registered a 6.4% gain and market pulp was up 7.4%. U.S. imports of paper and paperboard were up 11.5% from a year-earlier, despite the weak U.S. dollar. Much of the gain was in uncoated groundwood, up 34%, and newsprint, up 7%, according to API.

Among major grades, recycled board led the pack with a 9.6% increase. Containerboard production was up 6.9% on the strength of continued record fiber box shipments. Strong demand from commercial printers helped fuel a 9.0% increase in coated paper and a 3.0% gain for uncoated free-sheet.

Canadian newsprint shipments totaled 815,000 tons in May, up 5.8% from the same month in 1986, while operating rates climbed to 97%. Shipments were up 6.8% for the first five months. Woodpulp shipments declined 2.0% compared with a year-earlier, as operating rates continued at 90% of capacity. ■

	Latest month (000 short tons)		% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION[1]					
Newsprint	May	500	1.6	5,685	1.7
Uncoated groundwood (s)	May	123	2.5	1,543	2.3
Coated paper (s)	May	554	11.5	6,585	9.0
Uncoated free sheet (s)	May	891	1.7	10,598	3.0
Other printing/writing	May	98	−15.5	1,387	1.8
Total packaging and other paper (s)	May	398	−8.5	5,137	−0.5
Tissue	May	441	−0.7	5,205	1.6
Total paper	**May**	**3,024**	**1.5**	**36,140**	**2.9**
Unbleached kraft paperboard	May	1,623	6.1	18,347	4.9
Semichemical medium	May	463	1.3	5,607	6.2
Bleached paperboard	May	373	0.0	4,448	3.5
Recycled paperboard	May	802	13.8	8,929	9.6
Total paperboard	**May**	**3,261**	**6.4**	**37,331**	**6.4**
Total U.S. paper and paperboard output	**May**	**6,285**	**4.0**	**73,741**	**4.7**
PULP, WASTEPAPER & FIBER[2]					
Total U.S. woodpulp production	Apr.	4,882	2.5	58,800	4.0
Market pulp production	Apr.	670	14.1	7,857	7.4
Wastepaper consumption at paper/board mills	Apr.	1,437	6.8	17,201	3.6
Pulpwood consumption (cords)	Apr.	7,855	1.5	93,942	3.1
CONVERTED PRODUCTS STATISTICS[3]					
Corrugated box shipments (billion ft²)	May	23.637	1.3	121.569[6]	3.6
Containerboard inventories at U.S. box plants and mills	May 1	2,375	−2.6		
INTERNATIONAL TRADE[2]					
U.S. paper imports (including products)	Apr.	1,038	21.5	12,421	12.0
Imports of Canadian newsprint	Apr.	704	12.5	8,642[6]	7.1
U.S. paper exports (including products)	Apr.	427	4.7	5,038	9.4
Exports of unbleached kraft linerboard	Apr.	177	−5.3	2,224	12.6
Exports of woodpulp	Apr.	390	8.9	4,619	3.9
Norscan pulp inventories[4]	May 31	936	−13.1		
Norscan pulp operating rates[4]	May	93%	100%	99%	98%
CANADIAN STATISTICS[5] *(reported in metric tons)*					
Total newsprint shipments	May	815	5.8	3,985[6]	6.8
Operating rates	May	97%	94%	98%	98%
Inventories held by U.S. consumers	May 31	1,336	−2.6		
Other paper/board shipments	May	531	5.1	2,644	6.2
Woodpulp shipments (export only)	May	600	−2.0	3,216	1.7
Operating rates	May	90%	90%	97%	89%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fibre Box Assn., Paperboard Packaging Council. 4. North American/Scandinavian paper-grade market pulp. 5. Canadian Pulp & Paper Assn. 6. Not annualized. (s) = Shipments.

BLEACHED PAPERBOARD: Market rebounds with good demand, few capacity additions

Grade structure: Solid bleached sulfate (SBS) paperboard is made primarily for folding carton and milk carton stocks from a furnish containing not less than 80% virgin bleached woodpulp. Other uses include file folders, linerboard, cups, round nested food containers, and plate/dish/tray stock. Calipers range from 10 to 28 pt, in low-, medium-, and high-density levels. Basis weights vary from 120 to 300 lb/3,000 ft². About half of the SBS produced is coated.

Production/capacity: Production in 1986 was up 8.7% to 4.29 million short tons, reaching the highest level on record, according to figures from the American Paper Institute. As a result, operating rates reached 94.6%, somewhat below the 1984 record of 96.7%. Exports also improved in 1986, rising 10.1% to 513,000 tons.

Capacity increases in recent years have been modest, keeping the market relatively firm even in downcycles. The market was even able to absorb the startup of a 175,000-tpy SBS paperboard machine at Westvaco Corp.'s Covington, Va., mill. No further major expansions are planned through the remainder of the 1980s. This is expected to keep capacity increases to just 104,000 tons, or about 0.8% annually, through 1989.

In some of the major end uses, 1986 production was up even sharper than the 8.7% overall increase. SBS folding carton stock, for instance, jumped 11.5%. Milk carton and food service board, however, was up in line with the rest of the market, by 5.6%. Most end-use markets remained fairly active early in 1987 as well.

Outlook. With capacity additions expected to remain negligible through the rest of the decade and no projected downturn in demand, SBS markets should be good through 1987. Production is forecast to rise 1.3% to 4.35 million tons this year, and operating rates should remain at about 94.6%.

Federal Paper Board Co. Inc.'s decision to modify its expansion plans at the Augusta, Ga., mill will help keep operating rates in line. No. 3 SBS machine's capacity will be raised only about 17,000 tpy, with completion scheduled for March 1988.

Demand for bleached board in 1987 should remain strong in the various end uses: folding carton stock should reach 2.05 million tons; milk carton stock, 650,000 tons; cup stock, 460,000 tons; and plate stock, 305,000 tons. Exports should rise 9.3% to 516,000 tons, provided currency exchange rates remain favorable.

Milk carton demand should remain relatively stable in 1987 as producers continue to develop new markets for liquid packaging, especially juices and juice derivatives. Competition from plastics should continue to ease as container sizes (notably, the gallon jug) in which plastics compete more effectively, have nearly reached the saturation point.

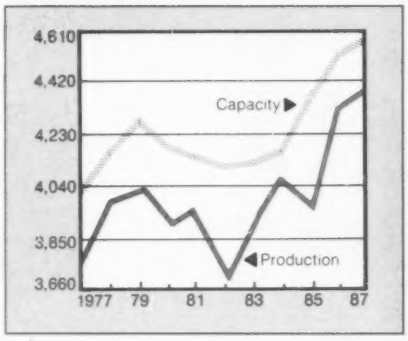
The most promising new market, however, will continue to be aseptic packaging. Food manufacturers will be looking at more ways to apply this relatively new technology to their products, increasing domestic demand. However, only one U.S. producer, International Paper Co., currently makes this highly specialized type of board.

Folding carton stock should also remain in good demand through 1987 as the proliferation of new products is expected to continue, as well as the repackaging of older, established products. Disposable dinnerware should also be in good demand this year from fast-food establishments. Consolidation in the cup business, with purchases in 1986 by James River Corp. and Fort Howard Corp., could cause some interesting competitive moves this year, however.

Prices: Levels began to recover in 1986 from the prior year's deterioration, with two hikes successfully implemented. Another increase slated for April 1987 was also in place in the second quarter, effectively increasing levels to about the same as their highs in 1984.

SBS 15-pt coated folding carton board (rolls), $/short ton, year-end: 1973, $300; 1974, $360; 1975, $360/365; 1976, $385; 1977, $405; 1978, $425/445; 1979, $490; 1980, $550; 1981, $625; 1982, $590/625; 1983, $590; 1984, $590/665; 1985, $550/590; 1986, $570/625; 1987 (June), $590/645.

SUPPLY/DEMAND (000 tons)



FORECAST (000 tons)

	1985	1986	1987e
Production[1]	3,948	4,293	4,347
Capacity	4,370	4,538	4,597
Utilization rate	90.3%	94.6%	94.6%
Imports	—	—	—
Exports[2]	466	513	561
Apparent U.S. consumption	3,482	3,780	3,786
lb/capita	29.08	31.28	31.15
GNP ratio	0.97	1.03	1.00

e = Estimate.
1. Because of grade switching, capacity utilization is difficult to define.
2. API production for export.

TOP U.S. PRODUCERS (000 tpy)

	Annual capacity (000 tons)	Market share (%)
1. Federal Paper	832	18.1
2. International Paper	810	17.6
3. Westvaco	657	14.3
4. Potlatch	537	11.7
5. Temple-Eastex	357	7.8
6. Champion Intl.	247	5.4
7. James River	235	5.1
8. Weyerhaeuser	200	4.3
9. Gulf States	190	4.1
10. Gilman Paper	185	4.0

Market share of top five companies:
69.5%

Market share of top ten companies:
92.5%

Total U.S. capacity (1987):
4.597 million short tons

NEWSPRINT

Ponderay, Finlay plan newsprint machines

Great Lakes Forest Products Ltd. and Finlay Forest Industries Ltd. have both committed to new newsprint mill projects. GLFP gave the expected go-ahead to build a 180,000-metric-tpy, US$300-million newsprint mill in eastern Washington state, while Finlay's board of directors formally approved a 216,000-tpy, C$198-million newsprint machine next to its refiner groundwood market pulp mill in Mackenzie, B.C. In addition, Newsprint South Inc. recently secured financing for its proposed 225,000-short-tpy greenfield newsprint mill, which would be constructed near Grenada, Miss.

The Washington state project is a joint venture among Lake Superior Forest Products Inc., a GLFP subsidiary, and five publishers. It was put on hold in 1985 when one of the five original publishing partners, Chronicle Publishing Co. (San Francisco, Calif.) pulled out. But Knight-Ridder Newspapers Inc. (Miami, Fla.) recently joined the four other publishers—Kearns-Tribune Corp. (Salt Lake City, Utah), McClatchy Newspapers (Sacramento, Calif.), Central Newspapers Inc. (Indianapolis, Ind.), and Copley Press Inc. (San Diego, Calif.) The new mill at Usk, Wash., about 50 miles north of Spokane, will be known as Ponderay Newsprint Co. (*P&P*, April 1987, p. 25).

LSFP will own 40% of the project and will act as managing partner, responsible for construction and operation. Other contractors will be chosen within several months and some site work may begin in late fall or in the spring, with startup probably in late 1989 or in 1990, a GLFP spokeswoman said.

First for interior B.C. The new Finlay newsprint machine will be the first ever constructed in the British Columbia interior. The 303-in.-trim, high-speed twin-wire will be supplied by Voith SA from Brazil. Work has already begun—with one report that 350 construction workers are already on the site—and startup is targeted for the spring of 1989. Croftech Inc., the British Columbia Forest Products Ltd.'s engineering division, will oversee the project, and H.A. Simons International is responsible for engineering. BCFP increased its interest in Finlay from 42.7% to 50% last April.

All of the existing mechanical pulp mill's output as well as a small amount of kraft pulp will be used by the new machine to make newsprint. Noting that groundwood pulp markets have been extremely volatile over the past few years, FFI president Conrad Pinette said the newsprint machine will bring "new stability and growth" to the company's integrated sawmill operations and pulping operations. Last year, the Finlay complex produced a record 137,000 tons of groundwood pulp and 248 million bd ft of lumber.

Total cost of the project is C$212 million, which includes $14 million for modernization of sawmills.

Newsprint South gets financing. A wholly owned subsidiary of Mississippi Chemical, Newsprint South Inc. recently secured public and private financing of approximately $290 million for its 225,000-tpy greenfield newsprint mill in Grenada, Miss.

Rust International Corp. is the engineering and construction contractor for the integrated thermomechanical pulp (TMP)/newsprint mill, which will have room for an additional machine, although only one is currently planned. A machine supplier will be chosen by about mid-August.

Newsprint South was awarded an $8.6-million Urban Development Action Grant and secured about $278 million in private funds from Wheelabrator Technologies Inc. and Signal Capital Corp. Construction is due to begin in October or November, with completion scheduled for late fall or early winter of 1989.

Alberta seeks newsprint mill. Provincial officials in Alberta, Canada, are seeking a forest products company and/or publisher to build a proposed integrated greenfield newsprint/publication papers mill in Alberta. A bleached chemi-thermomechanical pulp (CTMP) mill also is under consideration.

Public funds will likely be made available through loan guarantees and/or provincial and federal incentives. The newsprint mill probably would have a capacity betweeen 100,000 and 200,000 tpy and a cost of at least C$300 million. If built, the project would be the first paper mill in the province, which currently has two major pulp mills, wood products plants, and construction paper/board mills. Officials recently received a report on the potential project from Sandwell Swan Wooster Inc. of Van-

Major North American newsprint capacity expansions.

Company	Mill	Capacity (000 metric tpy)	Startup
Abitibi	Gatineau, Que.	60 (net) [1]	1987
Great Northern	E. Millinocket, Maine	93	1987
Kruger	Ville-ay-la Baie, Que.	72	1987
Donohue	Clermont, Que.	140 (net) [2]	1987
Crown Forest	Fife Trail, B.C.	50	1988
Abitibi	Alma, Que.	180 [3]	1988
Finlay Forest	Mackenzie, B.C.	216 [4]	1989
Kruger	Clermont, Que.	205 [4]	1989
Southwest Newsprint	Eufaula, Ala.	300 [5]	1990
B.C. Forest Products	Dew Point, B.C.	204 [6]	1990
GLFP	Thunder Bay, Ont.	60 (net) [7]	1991
Proposed			
[illegible]	Ashcroft, B.C.	200 [4]	n.a.
[illegible]	Gold River, B.C.	225 [4]	n.a.
[illegible]	Alma, Que.	180 [4]	n.a.

[illegible] machines. 2. New 190,000-tpy machine replaces older unit. 3. New 180,000-tpy machine replaces 45,000-tpy unit. 4. Conversion of existing paper. 5. Recycled newsprint. 6. Partnership with five publishers. 7. New 240,000-tpy machine replaces two older units.

couver, B.C., but specific conclusions of the study were not immediately available.

Still, the province reportedly has narrowed down the possible sites to five regions. Four of the five are: Brazeau, Whitecourt, Athabasca, and High Prairie. These forestlands are composed of a combination of softwood and hardwood timber (especially aspen, previously considered a "weed" growth), usable for pulp in most paper grades, although the province seems to be pushing hardest for a newsprint mill.

Possible Oregon mill. An as yet unnamed northwest U.S. forest products firm is considering the construction of an integrated TMP/newsprint or publication papers mill at sites near Medford, Ore. Also, a separate project, a kraft pulp mill, is being considered for Coos Bay, Ore.

The $300-million newsprint project faces several regulatory hurdles from both local and state environmental laws and is in the very preliminary stages of study, according to Daniel Breck of Woodbridge Reed Associates, the project consultant. Local residents at first expressed concern about air pollution from the pulp mill, but their fears were allayed when officials visited the Quesnel River, B.C., pulp mill, which makes both CTMP and TMP. The remaining barriers relate to effluent discharges into the nearby Rogue River, which is designated wild and scenic. ■

More newsprint capacity coming on in Europe

Shotton Paper Co. Ltd. is planning to build a second newsprint machine at its mill in northern Wales. Slated to start up by 1990, the 200,000-metric-tpy unit will double the mill's capacity, making it the largest newsprint producer in the U.K. This unit will push western Europe's newsprint capacity over the 8-million-tpy mark, up from 1.2 million tons in 1986.

Most of the machine's output will be sold in the U.K., but exports are expected to remain at their current level of 15% to 20% of mill output. The company has not yet decided what type of pulp it will use to furnish the new machine. The existing machine is supplied by an 800-tpd TMP line.

■ This month **Parenco BV** will start up new No. 1 newsprint machine at its Renkum mill in the Netherlands. The Valmet unit will make about 190,000 tpy of newsprint for western Europe. It will be supplied by a new 160,000-tpy Sprout-Bauer TMP line and will also use some secondary fiber. The new unit will increase mill capacity by 150,000 tpy to 550,000 tpy of newsprint.

■ **Hylte Bruks AB** of Sweden has ordered a 774-tpd Bel Baie newsprint machine from Beloit Walmsley to be installed at its mill in southwestern Sweden. The unit will start up in April 1989. ■

Great Northern completes rebuild of No. 5 machine

Great Northern Papers, a division of Great Northern Nekoosa Corp., recently brought on line rebuilt No. 5 newsprint machine at its mill in East Millinocket, Maine. No. 6 newsprint machine was shut down for modernization July 6.

The $155-million modernization (*P&P*, May 1987, p. 27) will increase potential mill capacity 40% to 326,000 tons, but the increase will be offset by the permanent shutdown of two other machines when both rebuilds are online in mid-September.

Other improvements already completed include upgrades of the pulping system and groundwood cleaning and thickening system, a new sulfite storage tower, new savealls, upgrade of the kraft refining system, and new mechanical wrapping and conveyor lines in the mill's automated finishing system. Drying sections for both machines also are being upgraded. ■

LINERBOARD

Gaylord to install 1,000-tpd machine at Bogalusa

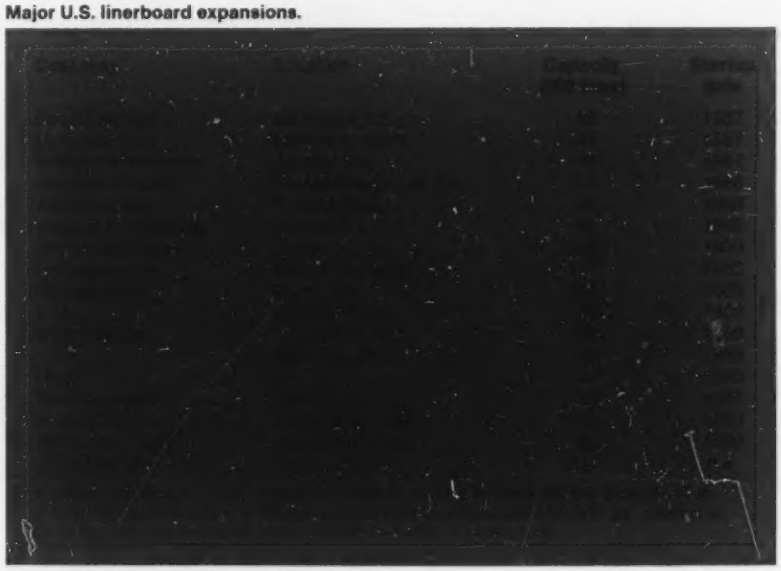
Gaylord Container Corp. has announced plans to invest more than $100 million to install a 1,000-tpd linerboard machine at its Bogalusa, La., mill. The machine is scheduled to start up by 1989 and will boost the mill's capacity from 1,500 tpd of linerboard and kraft paper currently to 2,500 tpd.

It will be the only new linerboard machine definitely scheduled for installation in the U.S. over the next several years.

CRS Sirrine Inc. has been contracted to design and engineer the machine, which will produce "the highest quality lightweight linerboard—42-lb and under—available in the industry," the company said.

A company spokesman indicated that the total cost of the project could be higher once engineering decisions

Major U.S. linerboard expansions.



are made regarding modifications to the pulping and recovery system needed to support the new machine. The mill's "back end" was significantly modernized by a $120-million program in the late 1970s, which may help to keep the total cost of the project down.

There are no definite plans to shut down any of the four remaining machines at the mill once the new machine is started up. Machines already existing at Bogalusa include No. 2 (124-in. trim), No. 5 (124-in.), No. 6 (144-in.), and No. 7 (198-in.) The three smaller machines all produce some bagpaper.

Formerly the containerboard division of Crown Zellerbach Corp., Gaylord was acquired last November by an investor group headed by president and chief operating officer Warren J. Hayford and chairman and CEO Marvin A. Pomerantz.

Hayford said the Bogalusa project reaffirms "our commitment to building Gaylord into a leading world-class packaging company." ■

Inland to modernize Orange mill, expand by 250 tpd

Inland Container Corp. recently announced the plans for a $60-million expansion of its Orange, Texas, linerboard mill. The Inland modernization project will add about 250 tpd of capacity at the mill and is scheduled to be completed in 1989.

The program will focus on improving production rates to bring productivity of the 19-year-old facility to a "competitive level," the company says. Temple-Inland Inc. is planning to upgrade the mill after its acquisition from Owens-Illinois Inc. in mid-1986.

The major projects announced will include an upgrade of the woodyard chip screening equipment, the replacement of the pulp mill digester control system and refiners, and overall modernization of the stock preparation area. In addition, the program includes modernization of the two paper machines and the two recovery boilers and the addition of new equipment to further reduce odorous emissions. Tampella announced that it would be supplying a new press section for No. 1 machine, including a Long Nip Press. ■

Australian firm acquires Georgia Kraft's Macon mill

A little-known Australian company has emerged as the successful bidder for Georgia Kraft Co.'s 1,500-tpd linerboard mill located in Macon, Ga. In addition, Pratt Holdings Pty Ltd. will acquire 200,000 acres of woodlands in Georgia and a large lumber and plywood manufacturing complex located at Madison, Ga., as part of the sale. The agreement, which is awaiting various government approvals, is expected to be completed in approximately two months.

When completed, the sale will result in a nonrecurring after-tax gain to Georgia Kraft of about $74 million, which will be passed through in equal shares to the joint venture's parents, Mead Corp. and Temple-Inland Inc.

Few details were available about the purchaser, who was mysteriously described in the press release announcing the sale as having "diversified interests in the forest products industry on four continents." Industry observers say the holding company has interests in packaging and financial services in Australia and owns a trading firm in the U.S. as well as an interest in a New Jersey box company.

The release also stated that "the new owner looks forward to working with the existing management to enhance the facilities and to increase productivity." The Macon mill has two linerboard machines and an original 200-in.-trim unit, as well as a 186-in.-trim Tampella machine that was installed in 1980. As part of that previous expansion, a 600-tpd secondary fiber plant and new bark power boiler were additionally installed at Macon.

The sale of the Macon mill is related to the planned dissolution of the Georgia Kraft joint venture that was announced earlier this year (*P&P*, May 1987, p. 27). Under the planned agreement, Mead would take over the Georgia Kraft venture's Phenix City, Ala., coated kraft board mill, while Temple-Inland would take over the linerboard mill that is located in Rome, Ga. ■

Weyco to buy six container plants from Mead Corp.

Mead Corp. will sell six of its corrugated container plants to Weyerhaeuser Co. as part of a program to refocus some of its assets as well as expand production of its coated kraft board. No sales price was disclosed.

The container plants are located in Albert Lea, Minn.; Amarillo, Texas; St. Joseph, Mo.; Memphis, Tenn.; Waterloo, Iowa; and Butner, N.C. (near Durham). The acquisition expands the number of container plants operated by Weyerhaeuser from 36 to 42 and increases their geographic coverage, according to a spokesman for the company.

Weyerhaeuser appears to be increasing its level of integration in containerboard—a strategy that other companies are pursuing in response to the last market downturn. Weyco purchased Tri-Wall Inc. (with three plants) in 1985 and bought a plant from St. Joe Paper Co. last year.

After the sale, Mead will continue to operate eight container plants, supporting them with containerboard from its 330,000-tpy semichemical medium mill in Stevenson, Ala. ■

LABOR

IP replaces striking workers at two of its mills

International Paper Co. has hired permanent employees to replace striking members of the United Paperworkers International Union at its mill in Jay, Maine, and at its Nicolet Paper Co. subsidiary in De Pere, Wis. Court injunctions at both Jay and at Lock Haven, Pa., have limited the number of pickets the UPIU can post at mill gates.

The UPIU has been striking IP at four mills: Jay, Lock Haven, De Pere, and Mobile, Ala.. The union has given notice that none of the striking locals will sign a new labor agreement at any one mill until there are acceptable contracts offered at all mills. In all, about 3,990 UIU members are striking IP.

Approximately 200 permanent replacements have been hired at the 1,300-tpd printing/writing paper mill in Jay, and applications are coming in at the rate of 100/day, according to mill spokesman Joseph Pietroski. The five paper machines at the mill are

PAPER PRODUCTION AND CONSUMPTION RECORDS BROKEN IN '86; '87 LOOKS GOOD

Latin America and Asia spearheaded the rise in production; currency fluctuations continue to be a big factor in industry profitability

By PETER SUTTON, JOHN PEARSON, HUGH O'BRIAN, International Editors

World paper and board production soared by 5.1% in 1986 to set a new record of 203.1 million metric tons. It was the first time that output had crossed the 200-million-ton mark and it is a landmark in the history of the industry. Apparent consumption also broke all records, rising 5.1% to 202.4 million tons. That corresponds to a per capita consumption of about 93 lb.

After a lackluster 1985, the improvement in output was general, with big gains being made on most continents. Percentage-wise, Latin America's 7.9% growth to 9.9 million tons was the most spectacular, while Asia registered a 7.4% growth, passing 41 million tons for the first time. North American production, having fallen in 1985, bounced back by 5.8% to 79.7 million tons. Western Europe recorded 3.5% growth, with output passing the 50-million-ton mark.

All figures in this review are in metric tons.

World pulp output also hit a new record of 146.1 million tons, up nearly 4% from 1985. The biggest growth was in North America, where output rose 5.8% to 73.6 million tons. Nordic countries increased their ouput to 19.3 million tons, up by just over 1%.

Two main factors behind the success of 1986 were:

- Sustained economic growth led by a U.S. economy that maintained its momentum, a steady western European performance, and—apart from Japan, where growth slowed—booming Pacific Rim nations.
- Resolution at the start of the year of oversupply problems in commodity grades of pulp, paper, and board with producers taking downtime to achieve a better supply/demand balance. This led to stable pricing by the second quarter in many paper grades.

By the end of the year, the supply/demand balance was good enough in newsprint and in kraftliner for generally slow but steady worldwide price improvements to be implemented. Growth in demand for advertising kept most printing grades buoyant, although price performance was patchy. For market pulp, prices rose steadily in the second half of 1986 and into the first-half of 1987.

World's top 20 producing and consuming countries

PAPER AND BOARD PRODUCTION (000 metric tons)

	1986	% change 1986/85
1. U.S.	64,416	+5.8
2. Japan	21,062	+2.9
3. Canada	15,234	+5.5
4. U.S.S.R.	9,975	+0.3
5. People's Rep. China	9,986	+9.6
6. Fed. Rep. Germany	9,405	+2.5
7. Finland	7,549	+1.4
8. Sweden	7,357	+5.1
9. France	5,585	+4.5
10. Italy	4,637	+1.1
11. Brazil	4,485	+11.5
12. U.K.	3,941	+4.7
13. Spain	3,153	+8.2
14. Rep. Korea	2,773	+19.9
15. Taiwan	2,527	+25.2
16. Mexico	2,470	+0.9
17. Austria	2,183	+2.6
18. Netherlands	2,042	+7.3
19. India	1,800	+13.2
20. Australia	1,642	+5.0

PULP PRODUCTION (000 metric tons)

	1986	% change 1986/85
1. U.S.	51,938	+5.7
2. Canada	21,686	+6.2
3. Sweden	9,395	+3.0
4. Japan	9,240	−0.4
5. U.S.S.R.	8,350	+0.4
6. Finland	7,928	−0.6
7. People's Rep. China	6,583	+6.4
8. Brazil	3,970	+5.1
9. Fed. Rep. Germany	2,219	+0.7
10. France	2,022	+3.9
11. Norway	1,954	−1.2
12 South Africa	1,875	+6.7
13. Spain	1,504	+4.5
14. Portugal	1,405	+5.0
15. Austria	1,344	+1.7
16. New Zealand	1,110	−3.1
17. Czechoslovakia	1,086	−2.7
18. India	1,050	—
19. Poland	876	+1.0
20. Australia	870	+1.2

PER CAPITA CONSUMPTION (lb/year)

	1986	% change 1986/85
1. U.S.	639	+2.1
2. Sweden	505	−3.4
3. Canada	465	+6.6
4. Finland	445	+6.9
5. Switzerland	421	+7.3
6. Fed. Rep. Germany	408	+6.3
7. Denmark	406	+7.6
8. Netherlands	392	+4.7
9. Japan	381	+3.6
10. Belgium	375	+5.6
11. New Zealand	348	−11.2
12. Hong Kong	337	—
13. Australia	320	−2.7
14. U.K.	315	+3.6
15. Norway	315	+4.4
16. Taiwan	289	+23.6
17. Austria	280	−4.5
18. France	278	+5.9
19. Iceland	245	+3.7
20. Italy	207	+3.3

REVIEW OF TOP 20 NATIONS IN PULP/PAPER PRODUCTION

Australia

Population: 16,000,000. Per capita consumption of paper and board: 145 kg/ 319 lb. Paper and board mills: 18. Pulp mills: 18 (sulfate: 2; sulfite: 1; semichemical: 4; mechanical: 8; soda: 2; non-wood: 1).

Paper/board capacity: 1,700,000 tons **Pulp capacity:** 1,225,000 tons

(000 metric tons)

	Production		Imports		Exports	
	1985	1986	1985	1986	1985	1986
Paper	1,091	1,177	861	775	76	92
Board	473	465	—	—	—	—
Total	**1,564**	**1,642**	**861**	**775**	**76**	**92**
Chemical woodpulp	—	—	—	—	—	—
Other pulps	860	870	186	223	10	20
Total	**860**	**870**	**186**	**223**	**10**	**20**

Austria

Population: 7,563,000. Per capita consumption of paper and board: 128 kg/ 282 lb. Paper and board mills: 34. Pulp mills: 15 (sulfate: 3; sulfite: 7; semichemical: 1; mechanical: 5; non-wood: 1).

Paper/board capacity: 2,533,000 tons **Pulp capacity:** 1,563,000 tons
Operating rate 1986: 86% **Operating rate 1986:** 86%

(000 metric tons)

	Production		Imports		Exports	
	1985	1986	1985	1986	1985	1986
Paper	1,786	1,832	302	318	1,204	1,303
Board	341	351	24	23	244	262
Total	**2,127**	**2,183**	**326**	**341**	**1,448**	**1,565**
Chemical woodpulp	999	1,035	278	291	277	330
Other pulps	322	309	37	25	—	—
Total	**1,321**	**1,344**	**315**	**316**	**277**	**330**

Brazil

Population: 138,493,000. Per capita consumption of paper and board: 29 kg/ 641 lb. Paper and board mills: 151. Pulp mills: 38 (sulfate: 16; sulfite: 3; soda: 6; semichemical: 4; non-wood: 9).

Paper/board capacity: 4,940,000 tons **Pulp capacity:** 4,416,000 tons

(000 metric tons)

	Production		Imports		Exports	
	1985	1986	1985	1986	1985	1986
Paper	3,536	3,998	119	278	484	668
Board	485	487	2	2	59	44
Total	**4,021**	**4,485**	**121**	**280**	**543**	**712**
Chemical woodpulp	3,371	3,510	37	38	926	896
Other pulps	405	460	2	2	11	18
Total	**3,776**	**3,970**	**39**	**40**	**937**	**914**

Canada

Population: 25,600,000. Per capita consumption of paper and board: 212 kg/ 467 lb. Paper and board mills: 76. Pulp mills: 34.

Paper/board capacity: 16,690,000 tons **Pulp capacity:** 24,833,000 tons

(000 metric tons)

	Production		Imports		Exports	
	1985	1986	1985	1986	1985	1986
Paper	13,742	14,508	373	421	9,858	10,412
Board	697	726	176	219	61	66
Total	**14,439**	**15,234**	**549**	**640**	**9,919**	**10,478**
Chemical woodpulp	11,456	12,219	167	170	6,501	7,085
Other pulps	8,963	9,467	53	50	669	750
Total	**20,419**	**21,686**	**220**	**220**	**7,170**	**7,835**

China, People's Rep. of

Population: 1,060,080,000. Per capita consumption of paper and board: 10 kg (e) /22 lb. Paper and board mills: 1,600e.

Paper/board capacity: n.a. tons **Pulp capacity:** n.a. tons

(000 metric tons)

	Production		Imports		Exports	
	1985	1986	1985	1986	1985	1986
Paper	2,706	2,742	319	175	95	104
Packaging paper/board	4,001	4,594	378	878	113	163
Other paper/board	2,405	2,650	111	165	19	40
Total	**9,112**	**9,986**	**808**	**1,218**	**227**	**307**
Chemical woodpulp	872	942	454	483	—	—
Mechanical pulp	403	402	16	26	—	—
Reed, bamboo, other pulps	4,911	5,239	60	67	1	7
Total	**6,186**	**6,583**	**530**	**576**	**1**	**7**

Finland

Population: 4,919,000. Per capita consumption or paper and board: 203 kg/ 447 lb. Paper and board mills: 46. Pulp mills: 47 (sulfate: 18; sulfite: 3; semichemical: 3; mechanical: 23).

Paper/board capacity: 8,305,000 tons **Pulp capacity:** 8,825,000 tons
Operating rate 1986: 90% **Operating rate 1986:** 90%

(000 metric tons)

	Production		Imports		Exports	
	1985	1986	1985	1986	1985	1986
Paper	6,476	6,489	51	53	5,411	5,335
Board	971	1,060	20	20	756	828
Total	**7,447**	**7,549**	**71**	**73**	**6,167**	**6,163**
Chemical woodpulp	4,808	4,850	15	27	1,304	1,270
Other pulps	3,168	3,078	47	48	230	204
Total	**7,976**	**7,928**	**62**	**75**	**1,534**	**1,474**

France

Population: 55,300,000. Per capita consumption of paper and board: 126 kg/ 277 lb. Paper and board mills: 147. Pulp mills: 24 (sulfate 7; sulfite: 3; semichemical: 5; mechanical: 9).

Paper/board capacity: 5,500,000 tons **Pulp capacity:** 2,300,000 tons

(000 metric tons)

	Production		Imports		Exports	
	1985	1986	1985	1986	1985	1986
Paper	4,822	5,056	2,072	2,317	1,162	1,291
Board	520	529	450	482	147	146
Total	**5,342**	**5,585**	**2,522**	**2,799**	**1,309**	**1,437**
Chemical woodpulp	1,498	1,585	1,518	1,655	311	345
Other pulps	448	437	105	114	2	0
Total	**1,946**	**2,022**	**1,623**	**1,769**	**313**	**345**

Germany, Fed. Rep.

Population: 61,073,000. Per capita consumption of paper and board: 185 kg/ 407 lb. Paper and board mills: 177. Pulp mills: 34 (sulfite: 8; semichemical: 1; mechanical: 25).

Paper/board capacity: 10,602,000 tons **Pulp capacity:** 2,455,000 tons

(000 metric tons)

	Production		Imports		Exports	
	1985	1986	1985	1986	1985	1986
Paper	8,246	8,466	3,946	4,471	2,315	2,462
Board	932	939	386	430	571	559
Total	**9,178**	**9,405**	**4,332**	**4,901**	**2,886**	**3,021**
Chemical woodpulp	818	816	2,841	3,010	116	127
Other pulps	1,385	1,403	86	67	—	—
Total	**2,203**	**2,219**	**2,927**	**3,077**	**116**	**127**

EXPANSION AHEAD. There are already signs of an investment boom ahead. That in turn may prove a mixed blessing for the industry. In the period late 1988-90, companies may be faced with severe price problems as overcapacity, especially in newsprint and printing grades, builds up. Through the end of this year, however, the outlook remains bright.

AFRICA

IN AFRICA, THE PULP AND paper industry is dominated by one country, South Africa, which accounts for two-thirds of the continent's paper and board output and for about three-quarters of its pulp production. It has become more difficult than usual to estimate Africa's real performance because South Africa stopped issuing official statistics for its paper and board production and trade at the end of the first quarter of 1986. But *Pulp & Paper International* estimates total 1986 African paper and board production was 2.38 million tons, up 6.1% from 1985. Pulp production was 2.37 million tons, up by nearly 8% from 1985.

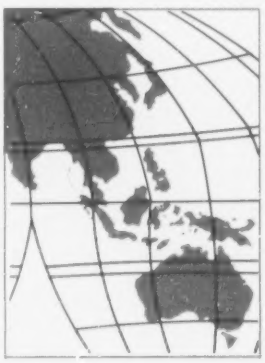
South Africa began to recover in 1986 from its worst recession in 40 years. Domestic demand for paper and board picked up in the second half of the year. At the same time, better international pricing for most bulk paper grades began to improve with two results for the country. First, the two major companies, Mondi and Sappi, began to enjoy better prices for their exports. And second, the flow of cheap imports into South Africa disappeared, allowing companies to improve their financial performances at home, too.

Between 1984 and 1985, Mondi and Sappi brought online major investments. By end-1986, both Sappi's Ngodwana mill expansion and Mondi's Richards Bay greenfield market pulp mill were running near capacity.

Nigeria has two out of its three major mill projects running, despite the downturn in the economy caused by the drop in oil prices. But both the kraft paper and board mill and the only newsprint mill in Nigeria are running below capacity, because of lower than expected domestic demand and difficulties in factors which affect many African countries—low per capita consumption, a weak economy, and difficulties in obtaining foreign exchange to buy raw materials.

In Zimbabwe, a good agricultural year led to good demand for paper and board, with output rising slightly to 75,000 tons. But the weakness of the South African rand against the Zimbabwe dollar and other local currencies led to a fall in the competitiveness of exports.

The countries of North Africa fared relatively well in 1986. Morocco's pulp makers enjoyed good demand for the 81,000 tons of bleached eucalyptus pulp produced during the year, and lower energy prices improved profitability. Egypt's Ratka mill completed an investment in a system to recover expensive chemicals from its straw pulping process. Meanwhile, Tunisia has also been investing. Early this year, a 15,000-tpy board machine started up at Enfidaville. Its output is expected to be sufficient to meet the country's entire future needs.



ASIA/ AUSTRAL-ASIA

A BOOMING DEVELOPMENT pace in Asia's pulp and paper industry continued relentlessly through last year, with output of paper and board rising by 7.4% to pass the 41-million-ton mark for the first time. Pulp output was also at a record level of 18.9 million tons, up 3.3%.

Dominant in 1986 were the first signs of structural change in the world's second largest market for paper and board, Japan. It's paper and board output rose by 2.9% to just over 21 million tons, but that was well below the 5.8% increase in 1985. Behind the slowdown was the fast-rising international value of the yen, which limited the competitiveness of Japanese exports, in turn creating a fall off in demand for grades such as packaging grades. The high value of the yen also made Japanese exports of paper less attractive in Pacific Rim countries, and a fall of 30,000 tons or 3.5% was recorded in 1986.

Meanwhile, Japan for the first time is seeing a rise in imports. Barriers to trade, tariff and non-tariff, are being

Production by continents, world total (000 metric tons)

	PULP					PAPER AND PAPERBOARD					
	1960	1970	1980	1985	1986		1960	1970	1980	1985	1986
North America	32,964	54,912	65,969	69,563	73,624	North America	38,917	58,914	70,225	75,286	79,650
Europe	20,965	34,853	40,235	41,966	42,480	Europe	25,634	45,159	59,023	65,960	67,761
Asia/Australasia	5,156	14,268	18,239	20,273	20,851	Asia/Australasia	7,861	20,621	31,962	40,580	43,397
Latin America	821	2,224	5,848	6,579	6,808	Latin America	1,656	3,712	7,737	9,213	9,942
Africa	124	900	1,502	2,194	2,369	Africa	288	892	1,717	2,246	2,382
World total	**60,031**	**107,157**	**131,793**	**140,575**	**146,132**	**World total**	**74,355**	**129,298**	**170,664**	**193,285**	**203,132**

TOP 20 PRODUCING NATIONS *(Continued)*

India

Population: 700,000,000. Per capita consumption of paper and board: 2kg/7lb. Paper and board mills: 288. Pulp mills: 1.

Paper/board capacity: 2,655,000 tons
Operating rate 1986: 68%

(000 metric tons)

	Production		Imports		Exports	
	1985	1986	1985	1986	1985	1986
Paper	—	—	—	—	—	—
Board	650	700	—	—	—	—
Total	**1,590**	**1,800**	**—**	**—**	**—**	**—**

Italy

Population: 57,212,000. Per capita consumption of paper and board: 94 kg/207 lb. Paper and board mills: 357. Pulp mills: 20 (sulfite: 1; semichemical: 3; mechanical: 15 non-wood: 1).

Paper/board capacity: 5,175,000 tons **Pulp capacity:** 830,000 tons

(000 metric tons)

	Production		Imports		Exports	
	1985	1986	1985	1986	1985	1986
Paper	3,691	3,752	1,461	1,641	817	890
Board	896	885	155	157	188	186
Total	**4,587**	**4,637**	**1,616**	**1,798**	**1,005**	**1,076**
Chemical wood-pulp	50	147	163	1,645	1,719	59
Other pulps	519	506	125	110	4	3
Total	**666**	**669**	**1,770**	**1,829**	**63**	**53**

Japan

Population: 121,672,000. Per capita consumption of paper and board: 173 kg/381 lb. Paper and board mills: 489. Pulp mills: 64 (sulfate: 38; sulfite: 5; semichemical: 10; mechanical: 28; non-wood: 4).

Paper/board capacity: 24,617,000 tons **Pulp capacity:** 12,617,000 tons

(000 metric tons)

	Production		Imports		Exports	
	1985	1986	1985	1986	1985	1986
Paper	17,619	18,238	665	817	606	637
Board	2,850	2,824	36	38	263	202
Total	**20,469**	**21,062**	**701**	**855**	**869**	**839**
Chemical wood-pulp	36	9,013	9,051	1,990	2,266	15
Other pulps	266	189	278	297	5	2
Total	**9,279**	**9,240**	**2,268**	**2,563**	**20**	**38**

Korea, Rep. of

Population: 41,569,000. Per capita consumption of paper and board: 63 kg/139 lb. Paper and board mills: 150. Pulp mills: 5 (sulfate: 1; mechanical: 4).

Paper/board capacity: 2,858,000 tons **Pulp capacity:** 426,000 tons

(000 metric tons)

	Production		Imports		Exports	
	1985	1986	1985	1986	1985	1986
Paper	1,900	2,206	87	121	56	106
Board	412	567	2	1	54	174
Total	**2,312**	**2,773**	**89**	**122**	**110**	**280**
Chemical woodpulp	129	144	631	677	0	0
Other pulps	138	143	49	63	0	0
Total	**267**	**287**	**680**	**740**	**0**	**0**

Mexico

Population: 81,000,000. Per capita consumption of paper and board: 30 kg/66 lb. Paper and board mills: 64. Pulp mills: 15 (sulfate: 8; mechanical: 1; non-wood: 6).

Paper/board capacity: 3,316,000 tons **Pulp capacity:** 957,000 tons

(000 metric tons)

	Production		Imports		Exports	
	1985	1986	1985	1986	1985	1986
Paper	2,189	2,199	99	68	39	136
Board	259	271	7	3	—	—
Total	**2,448**	**2,470**	**106**	**71**	**39**	**136**
Chemical woodpulp	710	648	271	312	—	2
Other pulps	110	124	40	33	—	2
Total	**820**	**772**	**311**	**345**	**—**	**4**

Netherlands

Population: 14,563,000. Per capita consumption of paper and board: 178 kg/392 lb. Paper and board mills: 33. Pulp mills: 3 (mechanical: 2; non-wood: 1).

Paper/board capacity: 2,181,000 tons **Pulp capacity:** 158,000 tons
Operating rate 1986: 94% **Operating rate 1986:** 87%

(000 metric tons)

	Production		Imports		Exports	
	1985	1986	1985	1986	1985	1986
Paper	1,297	1,383	1,427	1,513	804	887
Board	607	659	286	321	336	387
Total	**1,904**	**2,042**	**1,713**	**1,834**	**1,140**	**1,274**
Chemical woodpulp	—	—	525	568	18	24
Other pulps	138	133	30	25	3	2
Total	**138**	**133**	**555**	**593**	**21**	**26**

Spain

Population: 39,310,648. Per capita consumption of paper and board: 85 kg/187 lb. Paper and board mills: 165. Pulp mills: 26 (sulfate: 24; sulfite: 1; mechanical: 5; non-wood: 6).

Paper/board capacity: 3,390,000 tons **Pulp capacity:** 1,620,000 tons

(000 metric tons)

	Production		Imports		Exports	
	1985	1986	1985	1986	1985	1986
Paper	2,600	2,813	430	616	316	344
Board	313	340	29	40	113	93
Total	**2,913**	**3,153**	**459**	**656**	**429**	**437**
Chemical woodpulp	1,221	1,301	316	435	332	428
Other pulps	218	203	14	9	5	6
Total	**1,439**	**1,504**	**330**	**444**	**337**	**434**

Sweden

Population: 8,380,000. Per capita consumption of paper and board: 229 kg/504 lb. Paper and board mills: 55. Pulp mills: 55 (sulfate: 25; sulfite: 7; semichemical: 2; mechanical: 21).

Paper/board capacity: 7,885,000 tons **Pulp capacity:** 10,375,000 tons

(000 metric tons)

	Production		Imports		Exports	
	1985	1986	1985	1986	1985	1986
Paper	5,778	6,041	185	194	4,344	4,631
Board	1,223	1,316	69	77	921	1,005
Total	**7,001**	**7,357**	**254**	**271**	**5,265**	**5,636**
Chemical woodpulp	6,781	6,669	140	148	2,547	2,352
Other pulps	2,342	2,726	6	9	450	589
Total	**9,123**	**9,395**	**146**	**157**	**2,997**	**2,941**

dismantled, resulting in imports, which totaled 855,000 tons in 1986, now having a 4% share of consumption.

The fall in the yen's value made 1986 a boom year for two of the fastest growing paper industries along the Pacific Rim—Rep. Korea and Taiwan. Both were able to capitalize on the lower Japanese competitiveness in export markets. In Taiwan's case, output rose by 25.2% from 1985 to 2.53 million tons, and exports grew 59.9% to 149,000 tons. Domestic sales also rose 24.8%. Rep. Korea's performance was no less impressive. Paper and board output was up 25.2%, and exports rose 26.6%. Both countries are planning major capacity expansions for the period to end-1989.

For the third year running, People's Rep. China's paper and board output rose strongly. In 1986, it was just short of 10 million tons, up 9.6% from 1985. Output of packaging materials was up 15%. People's Rep. China is now the world's fifth largest producer of paper and board. However, per capita consumption remains a low 23 lb. Chinese pulp output also leapt by 400,000 tons in 1986 to 6.6 million tons. Indications are that the momentum in expansion of output will continue.

Indonesia's paper industry also made good progress in 1986. Output was 610,000 tons, up 20.6% from 1985. New capacity, especially in bulk grades such as newsprint, cut imports from 233,000 to 176,000 tons, while exports rose to 65,000 tons from 16,000 tons in 1985.

For the future, these key Asian economies look set to continue their fast growth, although Japan's growth will not be as fast as before.

Elsewhere in 1986, India showed a general improvement in output, although there are persistent labor and financial problems facing the paper companies. Meanwhile, in the Philippines optimism reigned as output rose, and 1987 promised one of the highest capacity utilization rates of recent years.

Output of paper and board in Australasia fell slightly in 1986, ending the year at 2.3 million tons. Pulp output fell from just over to just under 2 million tons. The main reason for the shortfall was a serious labor strike at one of the New Zealand mills.

The themes of 1986 for Australasia were restructuring and internationalization. It seems that both Australian and New Zealand companies are realizing that they are well situated to serve the fastest-growing paper and board markets in the world—the Pacific Rim countries.

In Australia, all the major companies have expansion plans and are eyeing the Pacific Rim as their market.

New Zealand's biggest company, Fletcher Challenge (FCL) has embarked on a major expansion of its forest products business. It is rumored to be looking for a Japanese partner to build a new newsprint paper machine at Tasman Pulp & Paper Co. Ltd.'s Kawerau mill on North Island in the early- or mid-1990s. FCL is also attempting to take over its main domestic rival, New Zealand Forest Products Ltd. NZFP is in turn trying to organize a merger with Australia's APM Ltd.

LATIN AMERICA

IN SPITE OF THE CONTINUING economic problems in most of the major countries in Latin America, it achieved the biggest percentage rise in paper and board output of any continent in 1986. The total production figure of 9.9 million tons was up 7.9% from 1985. Pulp production was also up by 3.5% to 6.8 million tons.

Brazil led the way with a 11.5% growth in paper and board production to 4.46 million tons. Per capita consumption rose to 64 lb from just over 57 lb in 1985. Stimulus for the 1986 growth came from government policy. In an attempt to arrest inflation, which was running at over 200%, prices and wages were frozen. A consumer boom resulted. GNP rose 8%. But by end-1986, the government was forced to suspend payments on its foreign debt, turning instead to the internal market for its borrowing. Internal interest rates rose to 40%/month. Inflation is now rising again, and it is forecasted to surpass 400% this year.

For Brazilian papermakers, the year saw domestic demand rise by about 8%. Government policy foresees a rise in education spending from 3% to 13% of the budget in the next few years, and this is expected to fuel domestic paper consumption for the future. In 1986, papermakers benefited from frozen pulp prices. For most of the year, the domestic price of bleached eucalyptus was only $220 to $240/metric tons (depending on the dollar-cruzado exchange rate). Pulp producers maintained their supplies to the internal market, mainly because they feared that the government would introduce controls on the amount that they were allowed to export if they did not fuel the internal boom. Profitability suffered. This year prices have been deregulated on the domestic market, and they have returned to international levels. The many pulp mill projects formulated last year are being held in abeyance, awaiting an improvement in the general economic situation.

A much brighter picture is to be seen in Chile. With an inflation rate of 17.4% and a rapidly falling external debt, it seems highly likely that at least one world-size pulp mill will start up by the early 1990s.

An important feature of 1986 was a spate of investment by New Zealand companies in Chile. It seems that the two nations will seek to cooperate in developing their resources, rather than competing against each other in the early part of the mid-1990s.

Argentina's paper industry also recovered in 1986 after a poor performance in 1985. The country still has weighty economic problems, but some stability is returning under the government's Austral stabilization

WORLD PULP, PAPER, AND BOARD INDUSTRY AT A GLANCE

	Population (1,000)	Number of mills		Capacity (1,000 tons)		Per capita	Consumption (1,000 tons)				Production (1,000 tons)			
							P & B		Pulp		P & B		Pulp	
		P & B	Pulp	P & B	Pulp	(lb)	1985	1986	1985	1986	1985	1986	1985	1986
EUROPE														
Belgium	10,000	14	2	974	385	375	1,611	1,703	599	597	841	850	321	304
Denmark	5,200	6	3	354	108	405	891	956	139	147	321	335	92	95
France	55,300	155	24	5,500	2,300	276	6,556	6,947	3,256	3,446	5,343	5,585	1,948	2,022
Germany, Fed. Rep.	61,073	177	36	10,602	2,455	407	10,624	11,285	5,014	5,169	9,178	9,406	2,203	2,219
Greece	9,700	22	3	430	65	132	528	583	163	217	325	373	20	28
Ireland	3,590	2	0	50	0	172	276	290	0	20	22	40	0	0
Italy	57,212	357	20	5,175	830	206	5,198	5,359	2,373	2,445	4,587	4,637	666	669
Netherlands	14,563	33	3	2,181	158	391	2,477	2,584	672	700	1,904	2,042	138	133
Portugal	10,230	94	8	805	1,352	124	522	578	435	438	650	665	1,336	1,406
Spain	39,311	165	26	3,390	1,620	189	2,943	3,372	1,432	1,514	2,913	3,153	1,439	1,504
United Kingdom	56,620	96	6	4,162	427	314	7,796	8,068	1,851	2,081	3,766	3,941	295	399
EEC	**322,799**	**1,121**	**131**	**33,623**	**9,700**	**284**	**39,422**	**41,725**	**15,934**	**16,774**	**29,850**	**31,026**	**8,458**	**8,776**
Finland	4,919	46	47	8,305	8,825	445	1,351	1,459	6,504	6,529	7,447	7,549	7,976	7,928
Norway	4,160	22	27	1,830	2,115	314	572	593	1,501	1,457	1,624	1,573	1,978	1,954
Sweden	8,380	55	55	7,885	10,375	504	1,990	1,992	6,272	6,611	7,001	7,357	9,123	9,395
Scandinavia	**17,459**	**123**	**129**	**18,020**	**21,315**	**510**	**3,913**	**4,044**	**14,277**	**14,597**	**16,072**	**16,479**	**19,077**	**19,277**
Austria	7,563	34	15	2,533	1,563	279	1,005	959	1,359	1,330	2,127	2,183	1,321	1,344
Iceland	244	0	0	0	0	245	26	27	0	0	0	0	0	0
Malta	355	0	0	0	0	56	9	9	0	0	0	0	0	0
Switzerland	6,523	29	6	1,135	365	419	1,161	1,243	568	594	1,023	1,087	306	310
Other W.Europe	**14,685**	**63**	**21**	**3,668**	**1,928**	**335**	**2,201**	**2,238**	**1,927**	**1,924**	**3,150**	**3,270**	**1,627**	**1,654**
Total W.Europe	**354,943**	**1,307**	**281**	**55,311**	**32,943**	**298**	**45,536**	**48,007**	**32,138**	**33,295**	**49,072**	**50,775**	**29,162**	**29,707**
Albania	2,968	4	4	15e	15e	12e	16e	16e	10e	10e	10e	10e	10e	10e
Bulgaria	8,989	15	9	520e	260e	130e	530e	530e	360e	360e	440e	440e	215e	215e
Czechoslovakia	15,562	49	22	1,370	1,223	184e	1,279	1,300e	994	1,000e	1,278	1,247	1,116	1,086
Germany Dem. Rep.	16,640	21	19	1,500e	750e	183	1,375	1,381	820	811	1,292	1,327	678	674
Hungary	10,100	10	6	550e	150e	149	665	686	280	249	494	517	92	62
Poland	37,600	48	20	1,500	1,059	80	1,336	1,370	1,025	1,007	1,284	1,320	868	876
Romania	22,772	20	12	850e	750e	67	695e	695e	740e	740e	800e	800e	660e	660e
USSR	275,000	84	57	10,750e	10,000e	74e	9,250e	9,300e	7,600e	7,650e	9,950e	9,975e	8,320e	8,350e
Yugoslavia	23,123	30	21	1,600	950	115	1,201	1,210	957	936	1,340	1,350	845	840
E. Europe	**412,754**	**281**	**170**	**18,865**	**15,157**	**88**	**16,347**	**16,488**	**12,786**	**12,763**	**16,888**	**16,986**	**12,004**	**12,773**
Total Europe	**767,697**	**1,588**	**451**	**73,968**	**48,100**	**185**	**61,883**	**64,495**	**44,924**	**46,058**	**65,960**	**67,761**	**41,966**	**42,480**
NORTH AMERICA														
Canada	25,600	76	34	16,890	24,833	464	5,069	5,396	13,469	14,071	14,439	15,234	20,419	21,686
United States	244,500	561	223	68,401	54,027	638	67,692	70,923	49,753	52,049	60,847	64,416	49,144	51,938
North America	**270,100**	**637**	**257**	**85,291**	**78,860**	**622**	**72,761**	**76,319**	**63,222**	**66,120**	**75,286**	**79,650**	**69,563**	**73,624**
ASIA														
Afghanistan	16,000	0	0	0	0	0e	2e	2e	0	0	0	0	0	0
Bangladesh	101,000	8	9	127e	126e	2	106	113	97	101	104	112	77	81
Bahrain	400	0	0	0	0	33e	6e	6e	0	0	0	0	0	0
Bhutan	1,400	0	0	0	0	2e	1e	1e	0	0	0	0	0	0
Brunei	200	0	0	0	0	33e	3e	3e	0	0	0	0	0	0
Burma	37,000	4	2	35e	35e	3e	47	43	30	26	27	23	30	26
China, Peo. Rep.	1,060,080	1,600e	-	12,000e	8,500e	23	9,693	10,897	6,715	7,152	9,112	9,986	6,186	6,583
Cyprus	700	0	0	0	0	95	30	30	0	0	0	0	0	0
Hong Kong	5,500	3	0	40e	0	336e	840e	840e	5e	5e	40e	40e	0	0
India	700,000	228	-	2,655	1,450	6	1,770	1,994	1,350e	1,340e	1,590	1,800	1,050e	1,050e
Indonesia	175,000	35	16	968	442	10	690	725	500e	560e	506	610	200e	250e
Iran	45,000	17	2	320e	250e	15e	310e	310e	80e	90e	100e	100e	50e	50e
Iraq	15,500	2	2	144	90	10e	70	70e	40e	40e	30e	30e	30e	30e
Israel	4,500	5	0	160	0	199	361	406	65	66	147	155	0	0
Japan	121,672	489	64	24,617	12,617	381	20,301	21,078	11,527	11,765	20,469	21,062	9,279	9,240
Jordan	3,500	1	0	18	0	42	60	66	5	10	15	14	0	0
Kampuchea	6,200	0	0	0	0	1e	2e	2e	0	0	0	0	0	0
Korea, Peo. Rep.	20,000	6	2	100e	80e	10e	90e	90e	50e	60e	80e	80e	50e	60e
Korea, Rep. of	41,569	150e	5	2,858	426	139	2,291	2,615	947	1,027	2,312	2,773	267	287
Kuwait	1,910	1	0	25	0	91e	73e	79e	10e	15e	20e	21e	0	0
Laos	4,000	0	0	0	0	0	1e	1e	0	0	0	0	0	0
Lebanon	2,700	3	0	50	0	83e	110e	102e	5e	5e	45e	42e	0	0
Macao	300	0	0	0	0	29e	4e	4e	0	0	0	0	0	0
Malaysia	15,600	13	1	100e	60e	61e	374	432	45	52	65	73	40	45
Mongolia	1,950	1	1	10e	10e	23e	20e	20e	5e	5e	5e	5e	5e	5e
Nepal	17,130	2	2	7	7	2	17	18	-	2	-	4	-	2
Oman	1,200	0	0	0	0	11e	6e	6e	0	0	0	0	0	0
Pakistan	88,000	15	-	160e	40e	7	309	278	123e	124e	119	107	100e	100e
Philippines	56,000	21	8	436	195	17	367	425	136	176	218	254	93	122
Qatar	300	0	0	0	0	73e	10e	10e	0	0	0	0	0	0
Saudi Arabia	9,000	0	0	0	0	24e	100e	100e	0	0	0	0	0	0
Singapore	2,500	2	0	85	0e	191	220	220	11e	10e	10	10	0	0
Sri Lanka	16,000	2	2	40e	25e	14e	127e	99e	29e	26e	27e	29e	21e	21e
Syria	10,500	3	0	35e	0	17e	80e	80e	10e	10e	5e	5e	0	0
Taiwan	19,479	152	3	3,000	500	288	2,063	2,545	541	600	2,018	2,527	350	394
Thailand	53,000	33	5	630	110	28	630	630e	160	170e	432	432e	40	50e
Turkey	52,000	36	17	800e	540e	33e	748	782e	480	550e	697	730	380	450
United Arab Emirates	1,300	0	0	0	0	10e	6e	6e	0	0	0	0	0	0
Vietnam	60,000	30e	1	120e	90e	2e	60e	66e	50e	55e	55e	60e	20e	25e
Yemen Arab Rep.	6,000	0	0	0	0	1e	2e	2e	0	0	0	0	0	0
Yemen Dem. Rep.	2,200	0	0	0	0	2e	2e	2e	0	0	0	0	0	0
Asia	**2,776,290**	**2,862**	**142**	**49,540**	**25,593**	**36**	**42,002**	**45,192**	**23,016**	**24,042**	**38,246**	**41,084**	**18,268**	**18,871**

All figures are metric tons. e = estimate.
†: Import figure includes Luxembourg.

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	Population (1,000)	Number of mills P & B	Number of mills Pulp	Capacity (1,000 tons) P & B	Capacity (1,000 tons) Pulp	Per capita (lb)	Consumption (1,000 tons) P & B 1985	Consumption (1,000 tons) P & B 1986	Consumption (1,000 tons) Pulp 1985	Consumption (1,000 tons) Pulp 1986	Production (1,000 tons) P & B 1985	Production (1,000 tons) P & B 1986	Production (1,000 tons) Pulp 1985	Production (1,000 tons) Pulp 1986
LATIN AMERICA														
Argentina	30,708	100	25	1,250	870	74	871	1,031	632	698	854	991	682	723
Bahamas	200	0	0	0	0	165	15e	15e	0	0	0	0	0	0
Barbados	300	0	0	0	0	61e	7e	7e	0	0	0	0	0	0
Belize	161	0	0	0	0	27e	2e	2e	0	0	0	0	0	0
Bolivia	6,195	1	0	2	0	7e	21e	21e	0	0	1	1	0	0
Brazil	138,493	151	38	4,940	4,416	64	3,599	4,053	2,902	3,096	4,021	4,485	3,776	3,970
Chile	11,882	18	7	433	900	55	290e	297e	334	282	369	388	837	847
Colombia	29,123	24	5	544	258	40	532	528	277	281	447	457	220	234
Costa Rica	2,655	2	1	18	25	99	110	120e	16	18e	12	12e	12	12e
Cuba	10,105	9	3	150e	60e	71e	325e	325e	88e	88e	125e	125e	40e	40e
Dominican Rep.	6,588	2	0	15e	0	22e	65e	65e	4e	4e	9e	9e	0	0
Ecuador	8,884	9	5	65	35	28e	113	113e	47	47e	68	68	25	25
El Salvador	5,072	3	0	50	0	29e	66	67e	10e	12e	28	29e	0	0
Guatemala	8,070	4	1	50	200	26e	95	95e	5	5e	35	35e	0	0
Guyana	798	0	0	0	0	19e	7e	7e	0	0	0	0	0	0
Haiti	5,800	0	0	0	0	2e	6e	6e	0	0	0	0	0	0
Honduras	4,500	0	0	0	0	14e	29e	29e	0	0	0	0	0	0
Jamaica	2,428	1	0	20	0	41e	45e	45e	0	0	15	15	0	0
Mexico	81,000	64	15	3,316	957	65	2,515	2,405	1,131	1,113	2,448	2,470	820	772
Neth. Antilles	300	0	0	0	0	22e	3	3	0	0	0	0	0	0
Nicaragua	3,038	0	0	0	0	18e	24e	24e	0	0	0	0	0	0
Panama	2,038	3	0	30	0	88e	82e	82e	1e	1e	27	27e	0	0
Paraguay	3,722	3	0	25e	0	15e	26e	26e	0	0	13e	13e	0	0
Peru	19,532	14	4	351	311	22e	197	199e	113	113e	150	152e	73	73e
Suriname	400	0	0	0	0	61	11	11	0	0	0	0	0	0
Trinidad/Tobago	1,185	0	0	0	0	15e	8	8	0	0	0	0	0	0
Uruguay	3,000	5	2	60e	30e	37	50	51	34	31	41	54	26	24
Venezuela	18,000	12	3	791	175	94	724e	767e	281	308	550	611	68	88
Latin America	**404,177**	**425**	**109**	**12,110**	**8,237**	**57**	**9,838**	**10,402**	**5,875**	**6,097**	**9,213**	**9,942**	**6,579**	**6,808**
AUSTRALASIA														
Australia	16,000	18	18	1,700	1,225	320	2,349	2,325	1,036	1,073	1,564	1,642	860	870
Fiji	700	0	0	0	0	22e	7e	7e	0	0	0	0	0	0
New Zealand	3,331	6	6	802	1,401	347	593	525	727	629	770	671	1,145	1,110
Papua New Guinea	3,500	0	0	0	0	4e	6	6e	0	0	0	0	0	0
Samoa	200	0	0	0	0	33e	3e	3e	0	0	0	0	0	0
Australasia	**23,731**	**24**	**24**	**2,502**	**2,626**	**266**	**2,958**	**2,866**	**1,763**	**1,702**	**2,334**	**2,313**	**2,005**	**1,980**
AFRICA														
Algeria	22,025	6	3	160e	170e	18e	170e	180e	90e	95e	100e	110e	30e	35e
Angola	7,950	2	1	30e	45e	5e	19e	19e	15e	15e	15e	15e	15e	15e
Benin	400	0	0	0	0	2e	4e	4e	0	0	0	0	0	0
Botswana	1,100	0	0	0	0	2e	1e	1e	0	0	0	0	0	0
Burkina Faso	6,900	0	0	0	0	0	1e	1e	0	0	0	0	0	0
Burundi	4,600	0	0	0	0	0	1e	1e	0	0	0	0	0	0
Cameroon	9,800	0	0	0	0	2e	10e	10e	0	0	0	0	0	0
Central African Rep.	2,700	0	0	0	0	1e	1e	1e	0	0	0	0	0	0
Chad	5,200	0	0	0	0	0e	1e	1e	0	0	0	0	0	0
Congo	1,800	0	0	0	0	1e	1e	1e	0	0	0	0	0	0
Egypt	49,000	16	3	180	60	20e	449e	449e	65e	65e	149e	149e	42e	42e
Ethiopia	42,289	1	0	12	0	1e	19	20e	4	4e	9	10	0	0
Gabon	900	0	0	0	0	5e	2e	2e	0	0	0	0	0	0
Gambia	800	0	0	0	0	6e	2e	2e	0	0	0	0	0	0
Ghana	13,200	0	0	0	0	2e	9e	9e	0	0	0	0	0	0
Guinea	5,700	0	0	0	0	2e	4e	4e	0	0	0	0	0	0
Guinea-Bissau	900	0	0	0	0	2e	1e	1e	0	0	0	0	0	0
Ivory Coast	10,056	1	0	40	0	13e	60e	60e	0	0	30	30	0	0
Kenya	19,000	5	1	80	60	14e	119	119e	57	57e	108	108e	53	53e
Lesotho	1,500	0	0	0	0	2e	1e	1e	0	0	0	0	0	0
Liberia	2,200	0	0	0	0	1e	1e	1e	0	0	0	0	0	0
Libya	4,000	10	0	10e	0	12e	21	21	6	6	6	6	0	0
Madagascar	10,000	2	2	19	7	2	11	11	9	11	11	11	5	5
Malawi	6,000	0	0	0	0	4e	12e	12e	0	0	0	0	0	0
Mali	7,700	0	0	0	0	0	1e	1e	0	0	0	0	0	0
Mauritania	1,700	0	0	0	0	5e	4e	4e	0	0	0	0	0	0
Mauritius	1,000	0	0	0	0	13e	6e	6e	0	0	0	0	0	0
Morocco	24,000	8	1	130	100	17	178	180	48	32	107	109	81	81
Mozambique	13,776	2	0	10e	0	3	17e	17e	3e	3e	2e	2e	0	0
Niger	6,500	0	0	0	0	1e	3e	3e	0	0	0	0	0	0
Nigeria	95,000	5	2	170	140	9	434	403	60	43	57	77	17	31
Rwanda	6,200	0	0	0	0	2e	4	5	0	0	0	0	0	0
Senegal	6,600	0	0	0	0	1e	4	4e	0	0	0	0	0	0
Sierra Leone	3,900	0	0	0	0	1e	1e	1e	0	0	0	0	0	0
Somalia	7,600	0	0	0	0	1e	2e	2e	0	0	0	0	0	0
South Africa	32,465	17	10	1,950e	2,160e	88e	1,293	1,295e	1,345e	1,445e	1,510	1,611e	1,725e	1,875e
Sudan	21,500	2	0	10	0	6	64	55	0	0	9	9	0	0
Swaziland	700	0	1	0	180	6e	2	2	0	0	0	0	174	180
Tanzania	21,733	2	2	60	60	5e	45e	45e	5e	5e	20	20	0	0
Togo	3,000	0	0	0	0	0	02	0.2	0	0	0	0	0	0
Tunisia	7,352	5	1	30e	20e	27e	90e	90e	30e	30e	30e	30e	20e	20e
Uganda	14,733	1	0	5e	0	1e	7e	7e	3e	3e	2e	2e	0	0
Zaire	32,985	1	0	4e	0	1e	10e	10e	2e	2e	2e	2e	0	0
Zambia	6,770	1	0	10	0	7e	26e	26e	0	0	6e	6e	0	0
Zimbabwe	8,400	3	2	90	49	22	78	82	57	55	73	75	32	32
Africa	**551,634**	**90**	**29**	**3,000**	**3,042**	**13**	**3,189**	**3,169**	**1,799**	**1,671**	**2,246**	**2,382**	**2,184**	**2,369**
TOTAL WORLD	**4,793,611**	**5,626**	**1,012**	**226,409**	**166,458**	**93**	**192,631**	**202,443**	**140,599**	**145,890**	**193,285**	**203,132**	**140,575**	**146,132**

TOP 20 PRODUCING NATIONS

Taiwan

Population: 19,479,000. Per capita consumption of paper and board: 131 kg/ 288 lb. Paper and board mills: 152. Pulp mills: 3 (sulfate: 2; non-wood: 1).

Paper/board capacity: 3,000,000 tons **Pulp capacity:** 500,000 tons

(000 metric tons)

	Production		Imports		Exports	
	1985	1986	1985	1986	1985	1986
Paper	1,560	1,917	138	155	45	69
Board	458	610	0	12	48	80
Total	**2,018**	**2,527**	**138**	**167**	**93**	**149**
Chemical woodpulp	342	383	247	282	75	107
Other pulps	8	11	20	32	1	1
Total	**350**	**394**	**267**	**314**	**76**	**108**

United Kingdom

Population: 56,620,000. Per capita consumption of paper and board: 142 kg/ 312 lb. Paper and board mills: 96. Pulp mills: 6 (semichemical: 2; mechanical: 2; non-wood: 2).

Paper/board capacity: 4,162,000 tons **Pulp capacity:** 427,000 tons
Operating rate 1986: 95% **Operating rate 1986:** 93%

(000 metric tons)

	Production		Imports		Exports	
	1985	1986	1985	1986	1985	1986
Paper	2,639	2,872	3,744	3,817	320	367
Board	1,127	1,069	860	940	254	263
Total	**3,766**	**3,941**	**4,604**	**4,757**	**574**	**630**
Chemical woodpulp	295	399	1,339	1,465	1	3
Other pulps	—	—	220	222	2	2
Total	**295**	**399**	**1,559**	**1,687**	**3**	**5**

United States

Population: 244,500,000. Per capita consumption of paper and board: 296 kg/ 651 lb. Paper and board mills: 561. Pulp mills: 223 (sulfate: 201; sulfite: 18; semichemical: 35; mechanical: 45).

Paper/board capacity: 68,601,000 tons **Pulp capacity:** 54,027,000 tons
Operating rate 1986: 94% **Operating rate 1986:** 92%

(000 metric tons)

	Production		Imports		Exports	
	1985	1986	1985	1986	1985	1986
Paper	50,867	53,824	9,992	10,256	2,420	2,887
Board	9,980	10,592	62	95	789	957
Total	**60,847**	**64,416**	**10,054**	**10,351**	**3,209**	**3,844**
Chemical woodpulp	43,316	45,767	3,792	3,878	2,868	3,378
Other pulps	5,828	6,171	259	278	574	667
Total	**49,144**	**51,938**	**4,051**	**4,156**	**3,442**	**4,045**

U.S.S.R.

Population: 275,000,000. Per capita consumption of paper and board: 34 kg (e) /75 lb. Paper and board mills: 84. Pulp mills: 57

Paper/board capacity: 10,750,000e tons **Pulp capacity:** 10,000,000e tons

(000 metric tons)

	Production		Imports		Exports	
	1985	1986	1985	1986	1985	1986
Paper	5,960	5,985	534	534	1,028	1,030
Board	3,990	3,990	166	166	372	370
Total	**9,950**	**9,975**	**700**	**700**	**1,400**	**1,400**
Chemical woodpulp	6,720	6,750	350	350	1,070	1,070
Other pulps	1,600	1,600	—	—	—	—
Total	**8,320**	**8,350**	**350**	**350**	**1,070**	**1,070**

plan. Paper and board output rose 16% to 723,000 tons.

Turning to Central America, the industry stays in the doldrums. Mexico's most severe economic crisis in recent times, sparked by the fall in oil prices at the end of 1985, led to a 3.9% decrease in GNP. Paper and board output rose only 1% to 2.47 million tons, helped by strong exports, which totaled 5.5% of production. Pulp output fell 6% to 772,000 tons, due to the closure of uneconomical pulp lines. In 1987, GNP is set to return to a positive growth rate of 2% to 3%, but inflation is still set to stay above 100%. Demand growth for paper and board is expected to return to a normal growth rate of 4% to 5%.

EUROPE

THE TOTAL PAPER AND board output for Europe, West and East combined, rose by 2.7% in 1986 to a new record level of 67.8 million tons. Pulp output also climbed by 1.2% to 42.5 million tons. It was Europe's fifth successful year in a row, and it seems that a major period of expansion lies ahead—especially in newsprint and printing/writing grades—as companies plough profits back into new paper machines.

The 12 nations of the European Community (Spain and Portugal became members of this group on Jan. 1, 1986) enjoyed a highly successful 1986. The biggest papermaking nation and the biggest market in the EEC, Fed. Rep. Germany, had a 6.2% rise in apparent consumption. Due to the high international value of the deutschemark, two-thirds of the increase was fueled by imports. Output rose by 2.5% to 9.4 million tons and exports were 3.0 million tons, up 4.7%. The period to 1989 will see the startup of one major new lightweight coated (LWC) line and big investments in the coated woodfree paper sector as well.

In France, there are finally signs of a return of investment capital in the industry after a period of stagnation since 1980. Consumption was up by 6.0%, production by 4.5% to 5.6 million tons, and imports by 11.0%. The year ahead will see some important startups in the newsprint and coated paper sectors. In the U.K. papermaking is also reviving and entering a period of cautious growth. Output of paper and board in 1986 was 4.6% to 3.94 million tons, with newsprint and woodfree printing/writing accounting for the increase. By end-1989, the U.K. will have started its first LWC line and at least one, and possibly two, 180,000-tpy newsprint machines.

Italy, the EEC's other big market, showed growth in paper and board output of 1.1% to 4.64 million tons. Some rationalization of the industry's chaotic structure, especially in the printing/writing is beginning to occur.

New members, Spain and Portugal, have boosted the EEC's self-sufficiency in pulp and pulpwood for papermaking and in kraftliner. Also, the low costs of produc-

tion in these countries drew in investment during 1986, and considerable interest is being shown for the future by countries outside the EEC that hope to obtain manufacturing bases there.

For the Nordic countries, Sweden, Finland and Norway, 1986 was also a generally successful year for the paper and board makers, with total output rising by 2.5% to 16.5 million tons. Total pulp production rose 1.0% to 19.3 million tons. Market pulp mills, however, were hit by the slide in the dollar's value against European currencies.

The year was marked by continued restructuring. In Sweden, Stora made a successful bid for the Papyrus group, becoming one of the world's ten biggest paper companies. In Finland, Metsäliiton Teollisuus merged with G.A. Serlachius to form Metsä-Serla. Early in 1987, Ahlström sold its Varkaus mill to Enso-Gutzeit.

It was also a year of innovation, with two Finnish companies developing new machine-finished lightly coated pigments (MFP) grades for the European market. In the grade spectrum, they are designed to fit between LWC and supercalendered (SC) in quality and price.

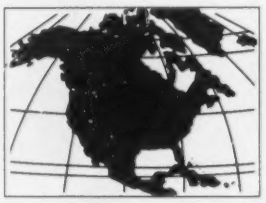
Some important startups are scheduled for the period to 1989. Two 200,000-tpy newsprint machines are set to start up in Sweden, while in Finland a new 180,000-tpy LWC line is set for startup late this year. Norwegian producers are investing $600 million, mainly in newsprint and magazine papers.

Other important investments outside the EEC included the startup in Austria in April this year of a new coated woodfree printing paper machine with a capacity of 140,000 tpy.

The buildup of capacity outside the EEC but targeted on its national markets has caused considerable concern in the past 12 months. The EEC paper mills' confederation Cepac believes that investment decisions, especially in European Free Trade Assn. (EFTA) countries, will add massively to overcapacity and will damage the competitiveness of EEC producers. The grades which are experiencing the biggest buildup in capacity are coated wood-containing papers, especially LWC. Cepac is monitoring imports and may ask the government of the EEC to take action at a later stage.

In eastern Europe, 1986 was not a successful year for the pulp and paper industry. Production was static at around 16.9 million tons. Several big problems confront the industry, among them: sluggish economies and a lack of paper machine building capacity.

For the present, attention is being concentrated on improving mill efficiency by more use of process control and a decentralization of the management of the industry. For the future, it seems that progress will be centered on opening up the vast forest resources of the U.S.S.R., at first in the hardwood-growing regions of the European part of the country, and later in the Far East of the country and in Siberia. This however, will take time and considerable funds.



NORTH AMERICA

TOTAL PAPER AND BOARD production in North America in 1986 was 79.65 million tons, 3.9% above the all-time record set in 1984 and 5.3% above 1985 levels. The U.S. industry enjoyed strong domestic and offshore demand. Paper and board production in 1986 reached 61.4 million tons, 5.9% ahead of 1985 and 3.7% above 1984's record amount. Exports jumped 19.7%, helped by the strong dollar. Imports of paper and board were up 3.6%.

Output of market pulp climbed to 6.7 million tons, 11% ahead of 1985. Domestic demand rose 5.9%. Pulp exports soared 17.5% while imports inched up 2.6%.

The stellar performers were printing/writing paper and kraft linerboard. Uncoated free-sheet output rose by 7.4%. Coated free-sheet producers made 6.6% more paper than in 1985. Production was spurred by strong demand from commercial printers and increased demand for forms bond and other writing papers from offices.

Production of unbleached kraftliner set a new record at 14.9 million tons--7.9% above the year-earlier level. Demand for corrugated shipping containers increased 6%. The export market for linerboard was particularly strong. Exports of this grade increased 13.6%.

Imports of paper and board strengthened in the first quarter of this year, rising 8.6% compared with an 8.4% increase in exports. Woodpulp exports increased 8.2% compared with first-quarter 1986. Imports of woodpulp rose 16%, reflecting a rise in shipments from Canada.

Shipments of pulp and paper from the Canadian industry rose 7% in 1986 to 23.3 million tons, besting 1985's record year by 1.5 million tons. As was the case in 1985, printing/writing grades showed the largest increase, with shipments rising 12% from 1985. Exports of woodpulp and shipments of packaging paper and board rose by 10% while newsprint shipments increased 3%.

The industry as a whole operated at 94% capacity in 1986. The Canadian industry was aided by the weak Canadian dollar. Compared with 1985, the Canadian dollar in 1986 was worth 35% less vis-a-vis the German mark and 20% less than the Swedish crown. This led to a 13% increase in offshore shipments. Shipments to Europe rose 25% and shipments to Japan were up 15%.

1987 will be a red-letter year for the North American industry. Operating rates in Canada are expected to reach 98%. Total shipments are anticipated to rise 5% this year to 24.3 million tons. Shipments to the U.S. are expected to grow 6%.

The U.S. industry, in the first quarter was producing paper and board at an annual rate of 65.3 million tons, 4.1% ahead of the year-earlier quarter. Output of chemical paper-grade market pulp rose 7.8% in the quarter. ■

PAPER INDUSTRY LEADERS CROWD SYMPOSIUM ON INTERNATIONAL TRADE

Trying to chart a profitable course for the 1990s, experts worry about growing protectionism, flattening demand, and currency fluctuations

By REGINA McGRATH, Assistant News Editor

Industry leaders from around the world met in May in an effort to gauge where certain discernable trends will lead pulp producers and papermakers in the next decade and beyond. Most of the attendees at the international symposium "Global Issues & Outlook in Pulp & Paper," sponsored by the Univ. of Washington, Seattle, Wash., asserted that they need a "level playing field" in which to do business, but not everyone agreed on exactly what that entails.

What most attendees did agree on, however, is that we haven't yet seen the end of the trend toward consolidation. More mergers will occur worldwide since the return on investment in building greenfield mills is too low in the mature industries (North America, western Europe, Scandinavia, Japan). Thus, most companies will be able to increase their market share only through acquisitions. In some cases, this has the added benefit of providing economies of scale. Companies will also specialize more as they try to dig a niche for themselves in increasingly competitive worldwide markets. Local markets will become less isolated, and customers' growing sophistication will lead them to buy the best available products at the lowest cost, regardless of which country makes the product.

THE MATURE COUNTRIES. Several speakers noted that paper consumption in the mature countries is not expected to grow substantially. This is a particular worry for the U.S., where imports remain at high levels despite the fall in the dollar's value. However, Furman C. Moseley, chairman of Simpson Paper Co., said that he is optimistic about the U.S. pulp and paper industry. He pointed out that many companies have slimmed down and rationalized operations, enabling them to more effectively compete in world markets. He also suggested that the new tax law could benefit the industry in the sense that capacity will now be built on an as-needed basis. He was even optimistic that the U.S. would be able to rectify its balance-of-payments problem in the near future.

Due to the high cost per ton of production, Moseley said that U.S. industry is ripe for a revolution in products and processes. He cautioned that two major factors could limit U.S. growth: exchange rate fluctuations and fast-growing plantations abroad. The U.S. should be able to maintain its domestic market, however, and the West Coast has a good jump on carving a substantial piece of the Pacific Rim pie, Moseley noted.

David Clark, executive director of the European Paper Institute, was worried about the high level of international debt, the unpredictable nature of currency fluctuations, and the high level of unemployment in many European countries. Like the U.S., Europe is now more dependent on economic growth than it previously had been. While the volume of trade has gone up western Europe, most of this is intraregional. According to EPI statistics, about half of the paper produced in Europe is exported from the producing country, but most of it stays in Europe. Europe remains a net importer of pulp, and it bought about 5 million tons of pulp from offshore sources in 1986.

Clark noted that capacity expansions in both newsprint and coated groundwood paper are coming on faster than is warranted by demand growth. This will force European producers to place more emphasis on exports outside of Europe and will probably result in increased downtime for producers. He emphasized that the U.S. market will be "crucial" to Europe.

Jiro Kawake, president of Oji Paper Co. Ltd. of Japan, also underlined the importance of the U.S. to his country, but aside from its dependence on U.S. woodchips, Japan's industry seems to be more interested in buying mills in the U.S., particularly since the yen is so strong relative to the U.S. dollar (Table 1). Although Japan is the second-largest paper producer and consumer after the U.S., its lack of large timber resources makes it heavily dependent on wastepaper. Kawake noted that about half of the fiber Japan consumes comes from recycled wastepaper, and about 60% of its pulpwood comes from domestic sources.

Kawake estimated that current paper and board capacity in Japan exceeds domestic demand by about 15%. But he believes that since domestic demand is expected

to grow at an annual rate of 2.4%, demand and supply will be balanced in the next five years. Kawake did not indicate where raw materials to support this expansion would be found, but he observed that Japan must consider importing finished products from projects developed abroad.

He noted that Settsu Corp.'s 21.5% ownership of Caraustar Industries Inc. is an example of such a development. It is also widely known that Daishowa Paper Mfg. Co. Ltd. is looking to buy a linerboard mill somewhere in the U.S. since its deal with Louisiana-Pacific Corp.'s Antioch, Calif., mill fell through this summer. More of Japan's industry may follow the lead of Kanzaki Paper, which purchased the former Ludlow mill in Ware, Mass., and is producing thermal and adhesive paper there for sale in the U.S. market.

FAST-GROWING PLANTATIONS. As Ron Aurell, senior vice president of Jaakko Poyry International Oy of Finland, observed in his keynote address, the main cost of making pulp and paper is wood, and mills have traditionally moved closer to cheaper wood supplies. During the next ten years, the increasing cost-competitiveness of market pulp mills in Brazil, South Africa, Chile, and New Zealand, among others, will enable these countries to dominate the world market for pulp.

Jose Luiz Paoliello, general sales manager of Cenibra in Brazil, estimated that an additional 1.5 million metric tpy of pulp would come onstream in the 1990s if all of Brazil's expansion plans come to fruition. Brazilian market pulp producers are frustrated in their attempts to earn foreign currency because the country's domestic paper industry is demanding increasing amounts of pulp to keep pace with soaring paper demand. Both the government and the World Bank are interested in seeing Brazil earn dollars to pay off its huge foreign debt, however, so it is expected that foreign funds will help Brazil expand its pulp output.

Paoliello rejected warnings that eucalyptus pulp will be in oversupply soon, calling this an "imaginary fear." He noted that Brazil's mills are highly cost-efficient due to the low wood costs they enjoy from the country's fast-growing plantations (eucalyptus can be harvested after seven years). Demand for eucalyptus pulp will continue to grow because hardwood pulp gives better formation, higher brightness, and better bulk than softwood pulp.

TABLE 1: **Overseas projects by Japanese companies.**

Japanese companies	Ownership	Name of venture	Local shareholders		Date established	Location	Production (pulp, paper)	Share of product imported by Japan
Honshu Paper Mitsubishi Corp.	32.24% 32.24	Crestbrook Forest Industries	Public	(35.52%)	1/1967	Skookumchuck, B.C., Canada	BSKP 560 MT/D	about 25%
Jujo Paper	14	Finlay Forest Industries	BCFP Cattermole	(43%) (43%)	11/1968	Mackenzie, B.C., Canada	RMP 450 MT/D	0 (after 1984)
Daishowa Paper Marubeni Corp. (through Daishowa-Marubeni International, Ltd.)	50	Cariboo Pulp & Paper	Weldwood of Canada	(50%)	4/1970	Quesnel, B.C., Canada	BSKP 750 MT/D	50%
Ohi Paper Sanyo-Kokusaku Pulp	35 5	Carter Oji Kokusaku Pan Pacific	Carter Holt Harvey	(60%)	5/1971	Napier, New Zealand	TMP 700 MT/D	100%
Japan Brazil Paper & Pulp Resources Development Co. (established by Overseas Economic Cooperation Fund and 19 companies)	48.42	Celulose Nipo-Brasileira	Companhio Vale do Rio Doce	(51.48%)	9/1973	Ipatinga, Minas Gerais, Brazil	BHKP 750 MT/D	50% (minimum)
Daishowa Paper (through Daishowa Canada Co., Ltd.)	50	Quesnel River Pulp	West Fraser Mills	(50%)	4/1977	Quesnel, B.C., Canada	TMP 500 MT/D	25%
Jujo Paper	10	North Pacific Paper	Weyerhaeuser	(90%)	8/1976	Longview, Wa., U.S.A.	Newsprint 1,200 MT/D	50%
Oji Paper Mitsui & Co.	25 8	NBIP Forest Products	CIP Inc.	(67%)	6/1980	Dalhousie, N.B., Canada	Newsprint, Publication Paper 1,000 MT/D	110,000 MT/Y (about one third)

Note: BSKP = Bleached Softwood Kraft Pulp
BHKP = Bleached Hardwood Kraft Pulp
RMP = Refiner Groundwood Pulp
Source: *Pulp & Paper Statistics* by Japan Paper Association and *Overseas Investment by Japanese Companies* by Toyokeizai Shinpousha.

Many producers of tissue and printing and writing paper prefer this pulp, and these are the areas in which demand, particularly in the lesser-developed countries, will be the strongest.

Roger Wiewel, who is senior vice president-marketing group, MacMillan Bloedel Ltd., said his company was using Brazilian eucalyptus pulp to produce some of its fine papers. He also conceded that Chile has an economic advantage in growing softwood. However, Wiewel revealed that studies are now being conducted by the Univ. of Washington on growing poplar in the Pacific Northwest to compete with fast-growing plantations. Preliminary results are encouraging, but more investment is needed to develop this area. Meanwhile, Wiewel foresees that the Canadian industry will have to export more paper and pulp, especially white paper, newsprint, and market pulp, to stay competitive. He predicted that Canada will continue to build more chemi-thermomechanical pulp (CTMP) projects because of their high return on fiber.

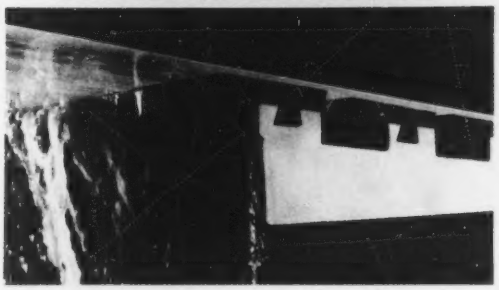
The situation is similar in Sweden, where intensive research is being done on high-yield thermomechanical (TMP) and CTMP to enable Swedish mills to get the most out of their limited fiber resources. Bo Wergens, president of the Swedish Pulp & Paper Assn., said that insidious deterioration of tree growth rates in Sweden is "very alarming," and called for an international effort to solve the problem.

THE SUBJECTIVE NOTION OF FREE TRADE. International consensus was not evident in discussions on free trade. Talk of free trade was guaranteed to offend someone at any given time. U.S. notions of free trade certainly do not jive with Canada's, and the U.S. trade imbalance with Japan was alluded to more than once, to the discomfort of both the Japanese and the Americans.

After giving the U.S. perspective on paper trade (see *P&P*, May 1987, p. 214), Irene Meister, vice president-international of the American Paper Institute, was asked if a universal open-trade system is a possibility. She replied that there is general recognition within the Reagan administration and among some members of Congress that even if all trade barriers were removed it would only rectify 15% to 20% of the trade imbalance. However, Meister additionally noted that this margin is crucial to the U.S. as a free trader. She observed that paper consumption depends on the level of economic development in other countries, and this economic development is ultimately hampered by tariffs as well as other protectionist measures.

This last point was underscored by some statistics given by Philip Wardle, senior forestry economist of the Food & Agriculture Organization. While average world paper consumption per capita is 40 kg/year, developing countries average 7 kg. This compares with 300 kg in the U.S. Small wonder that one of the United States' largest exports is wastepaper.

ACCURATE



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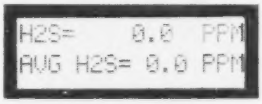

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CROWN FOREST'S NO. 5 NEWS MACHINE CONSISTENTLY THE WORLD'S FASTEST

Ever since the Elk Falls mill's startup in 1982, papermakers have been working to improve speed, efficiency, and product quality

By KENNETH E. SMITH, Executive Editor

Although the mill's origin can be traced back to 1950, Crown Forest Industries Ltd.'s Elk Falls mill near Campbell River, B.C., boasts a number of superlatives thanks to almost continuous expansion and modernization by its previous and current owners. Today, the Elk Falls mill can claim to have North America's largest hogged-fuel-burning power boiler, North America's largest thermomechanical pulp (TMP) plant, and the world's fastest newsprint machine. More than C$500 million has been spent on the mill in the last decade. Currently under way is a C$25-million project to add a seventh TMP line and increase overall TMP production to 1,600 metric tpd by mid-1988. The TMP screening system is being improved as well. Also under way is a project to convert the mill's one remaining fourdrinier newsprint machine, No. 2, to a twin-wire configuration. When these two projects are complete, Elk Falls newsprint production should rise to 500,000 metric tpy on three twin-wire machines.

In addition to quantity, Elk Falls turns out high-quality products. Its newsprint is consistently rated as having the best runability in western North America, according to pressroom reports. However, the mill has recently been in the news because its No. 5 Valmet SymFormer N machine set a new world speed record of 1,318 m/min (4,324 fpm) sustained for more than 40 hours. During that run the peak speed was 1,322 m/min (4,337 fpm). No. 5 machine, which trims 335 in., consistently appears among the top three in the Canadian Pulp & Paper Assn.'s rankings of the world's most productive newsprint machines (based on kg production/cm trim). No. 5 produces 40 to 52 g/m² weights with a furnish of approximately 86% TMP and 14% semi-bleached kraft. According to Crown Forest vice president and resident manager Bill Sharkey, a more typical performance for No. 5 would be on the average a speed of 1,280 m/min (4,199 fpm) and a daily production rate in excess of 600 metric tons.

GRADUAL SPEEDUP. No. 5 was started up in January of 1982 when state-of-the-art for newsprint machines meant operating at 3,500 fpm. However, according to Sharkey, the Crown Forest team had carefully studied newsprint production technology around the world and had the machine designed so that its major components would be capable of operating at 4,000 fpm. Crown Forest personnel—Sharkey says everyone in the mill deserves credit—have brought the machine gradually up to higher speeds during the past five years without major mechanical modifications. Suction blowboxes have been installed, and the first two dryer sections have been converted to serpentine felt runs. A new Valmet SymFlo headbox was also installed. Felt and wire suppliers have worked closely with Crown Forest to supply clothing capable of operating at higher speeds. But Sharkey credits the expertise of the machine crews for achieving the increased speeds. "The combination of having a machine with the potential to operate at higher speeds and the skills of our papermaking people have enabled us to push the speed up. It has been the ingenuity of our papermakers that has solved the various problems of operating at higher speeds," he says. Sharkey

TABLE 1: **Canadian Pulp & Paper Assn.'s top ten most productive newsprint machines, 1986.**

Company	Mill Location	Machine No.	Kg Production—Cm Trim
Smurfit Newsprint	Newberg, Ore.	No. 2	717.9
Bowater Southern	Calhoun, Tenn.	No. 5	708.6
Crown Forest	Elk Falls, B.C.	No. 5	703.2
Holmens Bruk	Braviken, Sweden	No. 51	689.1
B.C. Forest Products	Crofton, B.C.	No. 3	676.0
Kajaani Oy	Kajaani, Finland	No. 4	670.5
Holmens Bruk	Braviken, Sweden	No. 52	666.3
Smurfit Newsprint	Newberg, Ore.	No. 1	648.2
Rauma-Repola	Rauma, Finland	No. 3	647.3
Augusta Newsprint	Augusta, Ga.	No. 2	635.0

also feels that No. 5's potential is yet to be fully tapped. "With a little more work, we'll be able to sustain these impressive operating rates."

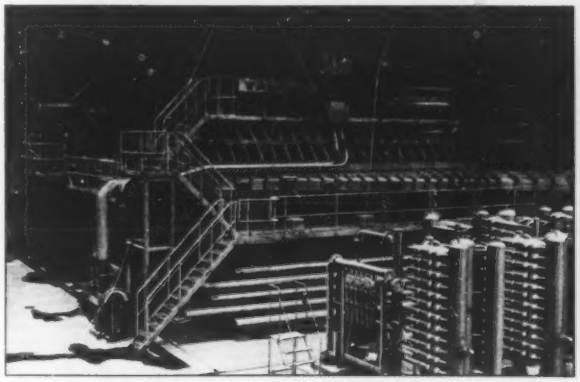
One of the unique features on No. 5 machine is the rubber-covered roll running in the center roll position on the machine's Sym Press II press section. The original granite center roll was replaced after it was found to be cracked. The rubber-covered replacement roll was manufactured by Valmet-Dominion, and Sharkey believes that Crown Forest is the only mill currently running with this unique type of configuration. Loadings in the three nips are 420, 450, and 620 pli, respectively. The section is additionally equipped with a Valmet steam box (29 adjustable zones) in the second press suction roll holding zone. Dryness out of the third press is 40% to 41%.

COMPANY HISTORY. The mill was originally built as a greenfield mill and started up in 1952 by the Elk Falls Co., which was a partnership between Canadian Western Lumber Co. Ltd. and Pacific Mills Ltd. In 1953 the Elk Falls Co. became a division of Crown Zellerbach Canada Ltd. In 1983, Crown Zellerbach Canada was purchased by Fletcher Challenge Ltd. of New Zealand, and the name was changed to Crown Forest.

In addition to newsprint, Crown Forests' versatile mill is able to produce 190,000 metric tpy of bleached and semibleached kraft market pulps. Its Elk Prime product is a fully bleached pulp manufactured from "mini-chip" (sawdust and residuals) British Columbia coastal softwood species. With an annual capacity of 160,000 metric tons, Crown Forest is the largest manufacturer of this product worldwide. Elk Prime is produced by M&D digesters then followed by bleaching and is said to exhibit properties of both softwood long-fiber and hardwood short-fiber pulps. Elk Prime is used as a substitute for hardwood where strength is desirable, can be used as a softwood pulp extender, and is used in the manufacture of printing and writing papers, tissue, toweling, and duplex linerboard. The Elk Falls mill also produces approximately 30,000 metric tpy of A16 semibleached market pulp primarily for newsprint use.

The mill's No. 4 machine has a 174-in. trim and produces 86,000 metric tpy in 25 different grades used for silver liner, natural liner, and medium; bleached and unbleached multiwall bags; checkstand and grocery bags, as well as specialty paper grades (saturating kraft, gumming, filter paper, butcher paper, and dissolving core stock). Most of this production is used internally by Crown Forest's packaging division located in Richmond, B.C.

Elk Falls' recently modernized kraft pulp mill consists of eight batch digesters, a Kamyr and two M&D continuous digesters. All wood used by both the TMP and kraft pulp mills is in the form of sawmill residuals. The mill is also a large consumer of hogged fuel with one boiler that produces 450,000 lb/hour of steam without auxiliary fuel. The company either owns or manages more than 2,000 square miles of prime British Columbia forestland.

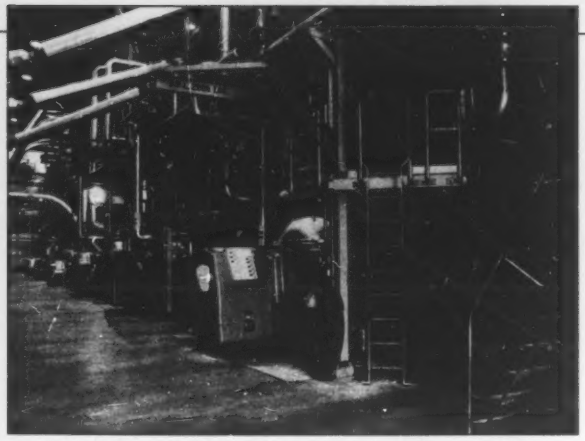


Crown Forest's No. 5 is consistently ranked among the world's top three most productive newsprint machines.

TMP MILLS. The Elk Falls mill has been a pioneer in the use of TMP for newsprint production for several reasons, including cheap hydroelectric power, management's desire to use sawmill residuals for pulping, and its efforts to improve newsprint quality. The first TMP installation at Elk Falls was in 1978 and consisted of a 450-tpd, three-line plant. Each line consisted of a primary and a secondary RLP 54/58S refiner supplied by Defibrator. The refiners are driven by a single 10,000-hp motor and have 58-in.-dia discs. In 1981-82, a 900-tpd addition was made to support No. 5 newsprint machine and to replace the groundwood mill. This consisted of three lines of two CD-70 conical disc refiners plus reject refining supplied by Sunds Defibrator. These refiners have discs with an independently adjustable conical section at the periphery and are each driven by a single 20,000 hp motor.

Sunds Defibrator and Crown Forest have worked closely to improve refiner control. Each refiner was fitted with Sunds' True Disc Clearance (TDC) sensors at installation. Sunds Defibrator, Crown Forest, and Univ. of Idaho have done extensive studies to model the relationship between refining intensity and high-frequency vibration, as reported by B.C. Strand and A. Mokvist at the recent 1987 International Mechanical Pulping Conference in Vancouver, B.C. Using process models describing the performance of the CD 70 refiners, Crown Forest installed and tested an online monitoring and analysis system at Elk Falls. Conclusions drawn from the study include the finding that refining intensity is a significant refining variable that affects the pulp quality-specific energy relationship. It was estimated that a large portion (40% to 45%) of the normally observed variation in pulp quality can be attributed to changes in refining intensity, while a smaller portion (15% to 20%) can be attributed to specific energy changes.

Using detailed analysis of the vibration signals from accelerometers mounted on the backside of stator plates on a CD refiner, Crown Forest identified three different



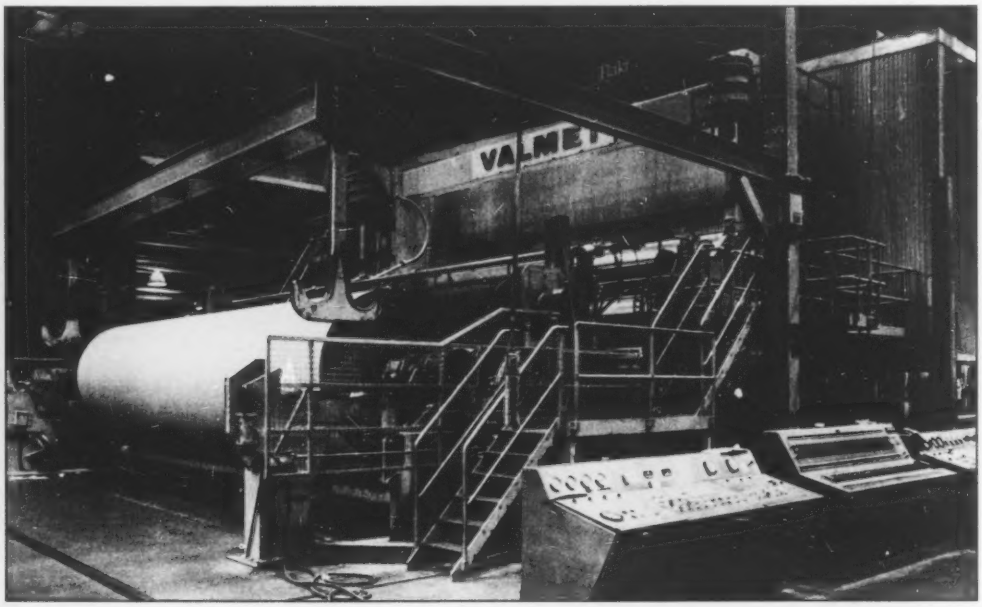
Elk Fall's TMP mill is the largest in North America—soon to reach 1,600 metric tpd.

phenomena that affect pulp quality: the energy split between the flat and conical zones, the plate condition, and the degree of fiber cutting. Based on process models that predict refiner performance in terms of these variables, the online monitoring and analysis system was developed and installed. The purpose of the system is to monitor the power split and plate condition, analyze this information and supply additional information to the operators for online setpoint optimization. This system should also allow operators to control total TMP mill power load by changing chip flow, chip moisture content, or kWh/ton without affecting pulp quality. This should minimize power required to reach a given quality window.

SATISFYING THE CUSTOMERS. Crown Forest, according to Sharkey, is a customer-oriented company. Its major newsprint customers are located in the 13 western states in the U.S. This market is served by its San Francisco-based Crown Newsprint Sales organization. Every one of its papermakers has visited a pressroom. Machine crews are responsible for quality and determine if finished paper can be shipped. As customers have demanded better print quality and a more uniform sheet, the mill has responded in several ways. No. 1 news machine wet end was converted to a Valmet SymFormer R configuration last year. No. 2 will be converted to a Beloit Bel Baie III wet end by mid-1987. Runability of Crown Forest's newsprint has improved to the point that customers often report 300,000 offset impressions without a washup.

To improve sheet uniformity, more testing is done to quantify formation on a numerical basis. Either the NUI or PAPRICAN formation testers are used. Technobright color meters are used for shade control, and more testing is also done offline for brightness. All three newsprint machines are equipped with cross-direction controls to reduce basis weight, moisture, and caliper variation. In addition, No. 5 is one of a few machines equipped with both cross-direction basis weight and reel hardness control supplied by AccuRay.

Through mid-1987 the newsprint market continues to remain firm, and Elk Falls' production is essentially sold out. Sharkey admits that the company has done preliminary studies for a new newsprint machine, but he won't say what factors might determine if that project gets the go-ahead. Crown Forest management will be closely analyzing the recent spate of new newsprint machine rumors and announcements to determine their plans. ■



A typical day's production for No. 5 would be in excess of 600 metric tpd.